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UTILITY PATENT APPLICATION TRANSMITTAL

(Only for new nonprovisional applications under 37 C.F.R. § 1.53(b))

Attorney Docket No. **BT10**
First Inventor or Application Identifier **JURMAIN**
Title **DEVICE FOR SIMULATING SOME ASPECTS OF CIG. USE**
Express Mail Label No. **EJ36560029345**

APPLICATION ELEMENTS

See MPEP chapter 600 concerning utility patent application contents.

1. ☒ * Fee Transmittal Form (e.g., PTO/SB/17)
(Submit an original and a duplicate for fee processing)
2. ☒ Specification [Total Pages **40**]
(preferred arrangement set forth below)
 - Descriptive title of the invention
 - Cross References to Related Applications
 - Statement Regarding Fed sponsored R & D
 - Reference to Microfiche Appendix
 - Background of the invention
 - Brief Summary of the invention
 - Brief Description of the Drawings (if filed)
 - Detailed Description
 - Claim(s)
 - Abstract of the Disclosure
3. ☒ Drawing(s) (35 U.S.C. 113) [Total Sheets **16**]
4. Oath or Declaration [Total Pages **3**]
 - a. ☒ Newly executed (original or copy)
 - b. ☐ Copy from a prior application (37 C.F.R. § 1.63(d))
(for continuation/divisional with Box 16 completed)
 - i. ☐ **DELETION OF INVENTOR(S)**
Signed statement attached deleting inventor(s) named in the prior application, see 37 C.F.R. §§ 1.63(d)(2) and 1.33(b).

NOTE FOR ITEMS 1 & 13: IN ORDER TO BE ENTITLED TO PAY SMALL ENTITY FEES, A SMALL ENTITY STATEMENT IS REQUIRED (37 C.F.R. § 1.27), EXCEPT IF ONE FILED IN A PRIOR APPLICATION IS RELIED UPON (37 C.F.R. § 1.28).

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5. ☐ Microfiche Computer Program (Appendix)
6. Nucleotide and/or Amino Acid Sequence Submission (if applicable, all necessary)
 - a. ☐ Computer Readable Copy
 - b. ☐ Paper Copy (identical to computer copy)
 - c. ☐ Statement verifying identity of above copies

ACCOMPANYING APPLICATION PARTS

7. ☒ Assignment Papers (cover sheet & document(s))
8. ☐ 37 C.F.R. § 3.73(b) Statement of Power of Attorney (when there is an assignee)
9. ☐ English Translation Document (if applicable)
10. ☒ Information Disclosure Statement (IDS)/PTO-1449 ☒ Copies of IDS Citations
11. ☐ Preliminary Amendment
12. ☐ Return Receipt Postcard (MPEP 503) (Should be specifically itemized)
13. ☒ * Small Entity Statement(s) ☐ Statement filed in prior application, Status still proper and desired (PTO/SB/09-12)
14. ☐ Certified Copy of Priority Document(s) (if foreign priority is claimed)
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☐ Continuation ☐ Divisional ☐ Continuation-in-part (CIP) of prior application No: _____
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STATUS (37 CFR 1.9(f) AND 1.27 (c)) - SMALL BUSINESS CONCERN**

Docket No.
BTO019USPT01

Serial No.

Filing Date

Patent No.

Issue Date

Herewith
Applicant/ **Jurmain**
Patentee:

Invention: **DEVICE FOR SIMULATING SOME ASPECTS OF CIGARETTE USE**

I hereby declare that I am:

- ☐ the owner of the small business concern identified below:
- ☒ an official of the small business concern empowered to act on behalf of the concern identified below:

NAME OF CONCERN: **Baby Think It Over, Inc.**ADDRESS OF CONCERN: **2709 Mondovir Road, Eau Claire, Wisconsin 54701**

I hereby declare that the above-identified small business concern qualifies as a small business concern as defined in 13 CFR 121.3-18, and reproduced in 37 CFR 1.9(d), for purposes of paying reduced fees under Section 41(a) and (b) of Title 35, United States Code, in that the number of employees of the concern, including those of its affiliates, does not exceed 500 persons. For purposes of this statement, (1) the number of employees of the business concern is the average over the previous fiscal year of the concern of the persons employed on a full-time, part-time or temporary basis during each of the pay periods of the fiscal year, and (2) concerns are affiliates of each other when either, directly or indirectly, one concern controls or has the power to control the other, or a third party or parties controls or has the power to control both.

I hereby declare that rights under contract or law have been conveyed to and remain with the small business concern identified above with regard to the above identified invention described in:

- ☒ the specification filed herewith with title as listed above.
- ☐ the application identified above.
- ☐ the patent identified above.

If the rights held by the above-identified small business concern are not exclusive, each individual, concern or organization having rights to the invention is listed on the next page and no rights to the invention are held by any person, other than the inventor, who could not qualify as an independent inventor under 37 CFR 1.9(c) or by any concern which would not qualify as a small business concern under 37 CFR 1.9(d) or a nonprofit organization under 37 CFR 1.9(e).

Each person, concern or organization to which I have assigned, granted, conveyed, or licensed or am under an obligation under contract or law to assign, grant, convey, or license any rights in the invention is listed below:

- ☒ no such person, concern or organization exists.
☐ each such person, concern or organization is listed below.

FULL NAME

ADDRESS

☐

Individual

☐

Small Business Concern

☐

Nonprofit Organization

FULL NAME

ADDRESS

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Individual

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Small Business Concern

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Nonprofit Organization

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Nonprofit Organization

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Separate verified statements are required from each named person, concern or organization having rights to the invention averring to their status as small entities. (37 CFR 1.27)

I acknowledge the duty to file, in this application or patent, notification of any change in status resulting in loss of entitlement to small entity status prior to paying, or at the time of paying, the earliest of the issue fee or any maintenance fee due after the date on which status as a small entity is no longer appropriate. (37 CFR 1.28(b))

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application, any patent issuing thereon, or any patent to which this verified statement is directed.

NAME OF PERSON SIGNING:

Mary M. Jurmain

TITLE OF PERSON SIGNING

OTHER THAN OWNER:

President

ADDRESS OF PERSON SIGNING:

BABY THINK IT OVER, INC.2709 Mondovi RoadEau Claire, Wisconsin 54701

SIGNATURE:

Mary M. Jurmain

DATE:

3/1/99

Device For Simulating Some Aspects Of Cigarette Use

1. Field of the Invention

The present invention relates generally to the field of smoking simulators, and more particularly to the field of devices which demonstrate to teenagers the loss of control over their lives caused by the habit of smoking cigarettes.

2. Description of Related Technology

Cigarette smoking is an addictive habit which is extremely difficult to break. The harm to a person's health caused by smoking is well documented. Furthermore, the habit is costly to support even if the user is not a heavy smoker. Numerous devices have been developed to help smokers quit, such as United States Patent No. 3,999,412, issued to Boroski et al. The Boroski et al. device is a cigarette case which counts and rations the number of cigarettes dispensed to the user.

Various smoking elimination systems utilize a timer which establishes a basic timing period during which a cigarette case or lighter is locked. These patents include U.S Patent No. 3,744,953, issued to Herr, U.S. Patent No. 2,681,560, issued to Shuttleworth et al. and U.S. Patent No. 2,643,527, issued to Harris. When the basic timing period is over, the cigarette lighter or box may be opened to permit a single use of a cigarette. Sometimes the timing period is manually adjustable and generally the timer must be manually reset each time a cigarette is removed from the case or a cigarette lighting operation takes place. In such a smoking elimination system, each time the user desires to smoke, she must try to operate the cigarette lighter or open the cigarette case to determine whether or not she can smoke. A related device is disclosed in U.S. Patent No. 3,424,123, issued to Giffard, in which the lock is eliminated and a bell signals the user that the basic timing period has expired.

Other more interactive programmable devices have been developed to assist, monitor, control or record various types of human behavior. U.S. Patent No.4,100,401, issued to Tutt et al. discloses a device that permits a user to input data representing caloric intake as well as expected caloric expenditure rates. The device then displays the instantaneous net balance of unconsumed calories. The Tutt et al. device does not generate any personalized program for behavior modification or any personalized programmed schedule of future event times. U.S. Patent No. 4,144,568, issued to Hiller et al. discloses a device which records various personalized data and provides related output data to the user. While the output data may be of interest to the user and might conceivably affect the user's future activities, the Hiller et al. device does not actually stimulate human behavior modification in any meaningful sense.

U.S. Patent No. 4,281,389, issued to Smith describes a device which is programmed to provide personalized metronome like audible signals designed to pace every other stride of a long distance runner. The necessary data may be manually input prior to the run, or the runner may manipulate manually accessible controls and modify the programming so as to conform with her actual stride frequency during a given run. Thereafter, the device is capable of providing a modified programmed stride rate so as to signal the stride rate required to achieve a desired run time.

U.S. Patent No. 4,360,125, issued to Martindale et al. shows a medicine dispenser which signals the user each time a medication event is supposed to occur and also records the time at which each medication access by the user actually occurs. The device only provides a health care worker with such a factual record and no attempt is made to create any modified program schedule for the future. U.S. Patent No. 4,428,050, issued to Pellegrini et al. discloses a device which accepts personalized data relating to skin tanning parameters and then provides the user

5 with a program which should be followed so as to achieve a desired degree of tanning. There is no baseline learning phase, nor is the device directed toward modification of habitual human behavior associated with a sequence of events.

10 U.S. Patent No. 4,853,854, issued to Behar et al., discloses a behavior modification device to help a user quit smoking. The device is a small pocket sized device that is controlled by a microprocessor programmed in read only memory with a specific control program. When a user activates the device by means of an external switch, the device begins a baseline establishment phase of the behavior modification process. Each time the user performs a habit related event, the user
15 informs the device through the use of a switch. The device records the event at the time of its occurrence for future processing. The device remains in the baseline phase for a predetermined period of time. When the baseline period ends, the device notifies the user and proceeds to the withdrawal phase of the program. Once the personalized withdrawal phase occurs, the device prompts the user by providing
20 visual and audio stimuli as to when the user may smoke one cigarette. A visual display also informs the user as to when permission to smoke again will be granted. The user notifies the device that the prescribed event has been committed by activating a switch.

25 Some devices exist which require a user to actually exhale into a handheld unit. An example of such a device is disclosed in U.S. Patent No. 5,291,898, issued to Wolf. The Wolf device is a breath analyzer which contains a tube into which a user exhales, the breath sample being analyzed for its alcohol content.

30 While some of the aforementioned devices deal with smoking and behavior modification, none address the problem of preventing a person from smoking who has never engaged in the habit. Further, none of these devices are actuated in a manner that attempts to accurately simulate the actual act of smoking. For example, none of the prior art devices simulate the spending of money to purchase

5 cigarettes, cause the user to crave a cigarette at inconvenient times due to nicotine addiction or simulate coughing caused by long term cigarette use.

Summary of the Invention

10 The present invention is a device which demonstrates to prospective smokers, who are most likely teenagers, the loss of control over their lives caused by smoking. The device is preferably a box which has the same dimensions and appearance as a package of cigarettes. The box contains a microprocessor connected to a liquid crystal display which displays messages to the user, or preferably a voice
15 recognition and synthesis circuit to permit spoken interaction with the device. The device gives orders to the user which simulate the effects of smoking while monitoring the user's responses. The device also presents the user with general information relating to the disadvantages of smoking and emphasizes the control that the habit of smoking can exert on the user's life.

20 The simulator also includes a vibrator and speaker or beeper to prompt the user to read the LCD display. A bellows switch is included to detect the action of the user inhaling or exhaling through a tube to simulate the drawing in of air through a cigarette and the need to catch one's breath after each draw. The tube is
25 replaceable to permit the use of the simulator by different users. Occasionally the device will cough or the user will be prompted by the device to cough and the act of coughing is detected by a built in microphone.

In order to simulate the expense associated with the habit of smoking, a slot
30 can be formed in the side of the simulator box which is sufficiently large to accept a dollar bill or suitable money substitute. A microswitch is placed within the cavity to detect when a dollar bill is actually inserted into the simulator. In a classroom environment, the currency accepting cavity can be opened by a key which is in the possession of the teacher. The times when the student is both permitted to smoke or

5 required to smoke can be programmed into or calculated by the unit, and a
pushbutton on the outside of the device can toggle through a choice of such time
periods in, for example, five minute increments.

10 In one preferred embodiment of the device, the smoking simulation program
which can be experienced by use of the device will last approximately three days.
The first day simulates the demands of smoking approximately one half of a
package per day. The second day simulates about one pack per day. The third day
of the simulation approximates the use of two packs per day. The messages
displayed by the device, which can include both requests and information, become
15 increasingly demanding and onerous as the simulation progresses. Ideally, the
simulator is capable of delivering hundreds of such messages in order to maintain
the user's interest. When the program is complete, the student has gained a better
understanding of the expense and inconvenience of smoking. The device is capable
of storing various parameters related to the student's interaction with the device,
20 and these parameters can be reviewed by the teacher in order to evaluate the level of
the student's performance.

Brief Description of the Drawings

25 Figure 1 is a front elevation of a smoking simulator constructed according to
the principles of the present invention;

Figure 2 is a side elevation of the apparatus depicted in Figure 1;

Figure 3 is a plan view of the apparatus depicted in Figure 1;

30 Figure 4 is a schematic diagram of a portion of the present invention which
includes a microprocessor and random access memory;

Figure 5 is a flow chart depicting the general operation of the present
invention;

Figure 6 is a flow chart depicting the powerup and initialization portion of
the software depicted in Figure 5;

5 **Figure 7 is a flow chart portraying the “Teacher Interrupt” portion of the software referred to in Figure 5;**

Figure 8 is a flowchart of a portion of the present invention which portrays the RUN subroutine;

Figure 9 is a flowchart of a portion of the present invention which portrays
10 **the SMOKING NOTIFICATION subroutine;**

Figure 10 is a schematic diagram of a preamplifier and power supply constructed according to the principles of the present invention;

Figure 11 is a flowchart depicting the INFORMATION NOTIFICATION subroutine utilized by the present invention;

15 **Figure 12 is a side sectional view of one embodiment of a puff receptacle and sensor associated with the present invention;**

Figure 13 is a perspective view of a second embodiment of a puff receptacle associated with the present invention;

Figure 14 is a flowchart depicting the COUGHING INTERRUPT subroutine
20 **utilized by the present invention;**

Figure 15 is a flowchart depicting the STUDENT PUSHBUTTON INTERRUPT subroutine associated with the present invention;

Figure 16 is a flowchart depicting the SMOKING ACTION subroutine utilized with the present invention;

25 **Figure 17 is a flowchart depicting the BUM CIGARETTES subroutine which forms a part of the present invention; and**

Figure 18 is a flowchart depicting the INFO ACTION subroutine utilized during operation of the present invention.

30

Detailed Description of the Preferred Embodiments

Nomenclature

1 Smoking simulation apparatus

5	2	Case
	3	Edge
	4	Hinge
	5	Surface
	6	Lid
10	7	Rear Surface
	8	Receptacle
	9	Speaker
	10	Microphone
	11	Recess
15	12	Switch
	13	Perforations
	14	Front
	15	Display Window
	16	Earphone Jack
20	17	Puffing Device
	18	Side
	19	Microcontroller
	20	Random Access Memory
	21	Data D7 pin 2
25	22	Data D6 pin 3
	23	Data D5 pin 4
	24	Data D4 pin 5
	25	Data D3 pin 6
	26	Data D2 pin 7
30	27	Data D1 pin 8
	30	Data D0 pin 9
	32	Visual Display
	33	Core Ground pin 33
	34	Core Power supply input pin 34

5	35	I/O 1.7 pin 35
	36	I/O 1.6 pin 36
	37	I/O 1.5 pin 37
	38	I/O 1.4 pin 38
	39	I/O 1.3 pin 39
10	40	I/O 1.2 pin 40
	41	I/O 1.1 pin 41
	42	I/O 1.0 pin 42
	43	I/O 0.7 pin 43
	44	I/O 0.6 pin 44
15	45	I/O 0.5 pin 45
	46	I/O 0.4 pin 46
	47	I/O 0.3 pin 47
	48	I/O 0.2 pin 48
	49	I/O 0.1 pin 49
20	50	I/O 0.0 pin 50
	51	Memory Data port D0 pin 13
	52	Memory Data port D1 pin 14
	53	Memory Data port D2 pin 15
	54	Memory Data port D3 pin 17
25	55	Memory Data port D4 pin 18
	56	Memory Data port D5 pin 19
	57	Memory Data port D6 pin 20
	58	Memory Data port D7 pin 21
	59	Data bus
30	60	Address Bus
	61	Address Line A1 pin 26
	62	Address Line A2 pin 25
	63	Address Line A3 pin 24
	64	Address Line A4 pin 23

- 5 **65** Address Line A6 pin 21
- 66** Address Line A7 pin 20
- 67** Address Line A8 pin 17
- 68** Address Line A9 pin 16
- 69** Address Line A10 pin 15
- 10 **70** Address Line A11 pin 14
- 71** Address Line A12 pin 13
- 72** Address Line A5 pin 22
- 73** Address Line A 13 pin 12
- 74** Address Line A14 pin 11
- 15 **75** Address Line A15 pin 10
- 76** Address Line A0 pin 27
- 77** Power Supply
- 78** Analog Power Supply
- 79** Battery
- 20 **80** Capacitor
- 81** Diode
- 82** Air Jets
- 83** Resistor
- 84** 470 microfarad capacitor
- 25 **85** Audio Preamplifier
- 86** Terminal
- 87** Core Power Supply
- 88** 2.2 ohm resistor
- 89** Electrolytic Capacitor
- 30 **90** Input/Output Power Supply
- 91** Resistor
- 92** Capacitor
- 93** Resistor
- 94** Capacitor

- 5 **95** Reset Terminal
- 96** Diode
- 97** Bandpass Filter
- 98** Automatic Gain Control Circuit
- 99** IGAIN0 Terminal
- 10 **100** IGAIN1 Terminal
- 101** 1000 ohm resistor
- 102** 22000 ohm resistor
- 103** 10000 ohm resistor
- 104** First Stage amplifier
- 15 **105** Third Stage amplifier
- 106** 0.22 picofarad capacitor
- 107** 4700 ohm resistor
- 108** 680000 ohm resistor
- 109** 27000 ohm resistor
- 20 **110** 1000 ohm resistor
- 111** 0.22 picofarad capacitor
- 112** Fourth Stage amplifier
- 113** 56000 ohm resistor
- 114** 1000 ohm resistor
- 25 **115** Low Analog Output terminal
- 116** High Analog Output terminal
- 117** Digital Ground Pin18
- 118** Digital Power supply input pin 19
- 119** Digital Ground Pin 52
- 30 **120** Digital Power supply input pin 51
- 121** 0.1 microfarad capacitor
- 122** Digital Ground
- 123** Core Ground input pin 1
- 124** Core Power supply input pin 68

- 5 **125** 0.1 microfarad capacitor
- 126** 0. 1 microfarad capacitor
- 127** Core ground
- 128** Core ground
- 129** Surface
- 10 **130** Analog ground input pin 64
- 131** Analog power input pin 67
- 132** 0.1 microfarad capacitor
- 133** Analog ground terminal
- 134** 14.3 MegaHertz crystal
- 15 **136** 27 picofarad capacitor
- 137** 27 picofarad capacitor
- 138** Oscillator 1 ouput pin 30
- 139** Oscillator 1 input pin 31
- 140** 32.768 KiloHertz crystal
- 20 **141** 27 picofarad capacitor
- 142** 27 picofarad capacitor
- 143** Oscillator 2 input pin 28
- 144** Oscillator 2 output pin 29
- 145** Read Code pin 53
- 25 **146** Write Code pin 54
- 148** Read Data pin 55
- 149** Write Data pin 56
- 150** 74HCT08 integrated circuit
- 151** Chip Enable pin 22
- 30 **152** Output Enable pin 24
- 153** Write Enable pin 29
- 154** Pulse width modulation output pin 66
- 155** Pulse width modulation output pin 65
- 156** Input/Output port 0.0 pin 50

- 5 **157** Input/Output port 0.1 pin 49
 158 Input/Output port 0.2 pin 48
 159 Input/Output port 0.3 pin 47
 160 Microswitch
 161 Bellows Switch
10 **162** Sound Activated Switch
 163 Pushbutton
 164 Flow restrictor
 165 Puffing device
 166 Mounting Bracket
15 **167** Check Valve
 168 Filter
 169 Overview Flowchart
 170 Powerup and Initialize
 171 Run
20 **172** Bootup procedure
 173 Password request and store
 174 Sleep mode
 175 Voice verification
 176 Time Entry prompt
25 **177** Clock Startup
 178 Teacher Prompt
 179 Pushbutton
 180 Teacher Interrupt
 181 Wakeup from sleep
30 **182** Request prompt
 183 Report Command
 184 Run Command
 185 Buy Cigarettes Command
 186 Packs Per Day Command

- 5 **187** Escalation Rate Command
- 188** Metabolic Rate Command
- 189** Susceptibility Command
- 190** Information Frequency Command
- 191** Set Number of Packages
- 10 **192** Initial Smoking Rate
- 193** Escalation Rate
- 194** Metabolic Rate
- 195** Susceptibility
- 196** Information Rate
- 15 **197** Return Path
- 198** Verification of Password
- 199** Brand Selection
- 200** Personality
- 201** Physiological Parameter Calculations
- 20 **202** Nicotine Craving Level
- 203** Smoking Action Module
- 204** Internal Timers
- 205** Smoking Notification Module
- 206** Notification Methods
- 25 **207** Device Scheduler
- 208** Information Notification Module
- 209** Notification Options
- 210** Notification Timer
- 211** Coughing Interrupt Module
- 30 **212** Notification Methods
- 213** Cough Prompt
- 214** Retry Option
- 215** Record Success
- 216** Record Failure

- 5 **217** Student Command
- 218** Random Number Generator
- 219** Belligerence Path
- 220** Repetition Step
- 221** Cooperation Path
- 10 **222** Borrowing Module
- 223** Information Action Module
- 224** Inventory Inquiry
- 225** None Available Announcement
- 226** Smoking Permitted Announcement
- 15 **227** Continuous Listening Subroutine
- 228** Consumption Rate Calculator
- 229** Return path
- 230** Counter
- 231** Demand
- 20 **232** Message Bank
- 233** Message Generator
- 234** Sound Monitor
- 235** Interrogatory
- 236** Record Failure
- 25 **237** Deathclock monitor
- 238** Recorder
- 239** Cigarette Inventory
- 240** Question
- 241** Failure Path
- 30 **242** Listen
- 243** Recognition
- 244** Playback
- 245** Decrement
- 246** Loop

- 5 **247** Tone Recognition
- 248** Increment
- 249** Question
- 250** Listening Interval
- 251** Correct Answer
- 10 **252** Correct Register
- 253** Incorrect Register
- 254** Dollar Bill Slot

Referring to Figures 1, 2, 3 and 12, a smoking simulation apparatus **1** is shown
15 which is housed in a case **2** which approximates the rectangular shape and dimensions of
a package of cigarettes. The case **2** is formed of a plastic or metallic material and houses
the mechanical and electrical components which comprise the active components of the
device. Analogously, the embodiment for other drug deterrence purposes might take the
form of a package of hypodermic needles or other drug-related paraphernalia. The intent
20 is to provide some sense of connection in the mind of the user between the deterrence
device and the addiction or habit being deterred.

On the front **5** of the enclosure **2** are grills for the speaker **9** and microphone **10**,
which are mounted inside. The grill for the microphone consists of two parts. First there
25 is the central receptacle **8** for the straw portion of the simulated cigarette to fit into. This
is the also primary opening for the microphone **10** to listen to speech and other sounds
from the outside world. Second, the peripheral holes **13** surrounding the central
receptacle **8** form jets of air **82** which impinge on the microphone **10** when the user puffs
through the simulated cigarette **17**. The jets of air **82** impinging directly on the
30 microphone **10** create a relatively loud white noise which is recognizable as a puff by the
sound recognition software.

An alternative embodiment also includes an LCD alphanumeric or graphics
display **32** for communicating silently to the user. The LCD display might show a

5 pictorial representation of a cigarette as it is being smoked by the user, showing it getting shorter. Simultaneously, the LCD might show a deathclock, showing average life expectancy lost if present rate of smoking continues, counting up in realtime as the user smokes. And the LCD can display textual information to the user, educating them on other aspects of smoking.

10

The top **6** of the enclosure flips opens like a hardpack of cigarettes. Inside the top of the enclosure are pushbuttons for the user (student) **163** or supervisor (teacher) **179** to wake up the microprocessor. There is also an earphone jack **16** for communicating without disturbing those in the vicinity (such as in a classroom). The fliptop **6** also
15 protects the buttons **163**, **179** from being pressed inadvertently, and keeps the earphone jack **16** clean of dirt or pocket lint, since the device **1** is intended to be carried in a shirt pocket or purse.

The side **18** of the enclosure **1** has a recess **11** to hold a simulated cigarette or
20 puffing device **17**. The puffing device **17** is held externally so its storage area **11** can be easily cleaned with an alcohol swab for sanitary purposes.

Referring also to Figure 13, the puff device **17** with flow restriction **164** .
The simulated cigarette or puffing device **17** has three main features: (a) A straw **165** that
25 fits into the receptacle **8** on the enclosure **1**, (b) A check valve **167** that prevents the user from blowing into the receptacle **8** and to keep the receptacle **8** clean for sanitary reasons, and (c) A fixed or removable filter **168** that acts as a flow restriction to simulate actual puffing resistance of typical cigarettes, as well as puffing difficulty caused by lung disease. A similar straw can also simulate inhaling cocaine and methamphetamines. An
30 alternative embodiment for deterring other drugs replaces the simulated cigarette with a simulated hypodermic (without the needle) that emits an inaudible but recognizable whistle when “injected”. The microphone **10** and software would hear and recognize the whistle and record that sound as an injection event.

5 Referring to Figure 4 some of the electronics of the present invention **1** can be appreciated. The simulator **1** is capable of both sensing sounds made by the user, such as coughing and inhaling, as well as generating spoken messages which instruct the user of the device. The speech recognition and speech synthesis functions are performed by integrated circuit **19**, which is preferably an RSC-164 microcontroller and speech
10 processing circuit manufactured by Sensory, Incorporated, 521 East Weddell Drive, Sunnyvale, California 94089. The specific function and features of circuit **19** are more fully described in United States Patent No.5,790,754, issued to Mozer et al The circuit **19** is powered by three isolated power supplies and ground reference levels. Digital power source **90** supplies digital Input/Output pins **117**, **118** **119** and **120**. Filtering is
15 accomplished by capacitor **121** and digital ground connection **122**. Core power supply **87** supplies core processing via pins **33**, **34**, **123** and **124**. Filtering is accomplished by capacitors **125** and **126**, and core ground connections **127** and **128**. Analog power supply **78** furnishes power for audio processing via pins **130** and **131**. Filtering is accomplished by capacitor **132** and ground connection **133**. Processing speed is controlled by a high
20 speed oscillator network composed of crystal **134**, capacitor **136** and capacitor **137**, which is connected to oscillator pins **138** and **139**. A low speed oscillator network consisting of crystal **140** and capacitors **141** and **142** is attached to microcontroller **19** pins **143** and **144**.

25 The circuit **19** includes sixteen general purpose Input/Output ports **35-50**. Each pin can be programmed as input with a weak pull up, an input with a strong pull up, an input without pull up or as an output. Microcontroller **19** also includes an external memory interface that allows connection to a standard nonvolatile static random access memory chip **20**. Microcontroller **19** includes separate read and write signals for each
30 external memory space. Microcontroller **19** is constructed with eight data input/output lines **21-27** and **30**, which are interconnected to the corresponding data input/output lines **51-58** via data bus **59**. Addressing is accomplished along address bus **60**. In this particular use of the microcontroller **19**, nineteen address lines (**61-76** and **40-42**) are used to address 512 kilobytes of memory stored in memory chip **20**. The nineteen

5 address lines are connected to pins **A0-A18** of memory chip **20**. The microcontroller **19**
controls memory access via pin **145** (read code), pin **146** (write code), pin **148** (read
data) and pin **149** (write data). These pins are ANDED together by chip **150** to provide
appropriate logic control to control memory chip **20**, the latter being controlled by pin
10 or received from memory chip **20** is transferred via the data bus **59** to connecting pins **D0-**
D7 of microcontroller **19** and connecting pins **51-58** of the memory chip **20**. Audio
output is provided via speaker **9** which is attached to the pulse width modulation output
pins **154** and **155** of the microcontroller **19**.

15 Referring to Figure 10, the power supply **77** includes three separate power supply
elements. The analog power supply **78** receives its input power from system battery
supply **79** which is preferably formed from three “AAA” alkaline batteries wired in
series. Capacitor **80** and diode **81** form a half wave rectifier or filter which also protects
the remaining circuitry against incorrect (reverse polarity) battery insertion. Analog
20 power supply **78** is isolated and filtered by resistor **83** and capacitor **84**. The analog
power supply **78** provides power to audio preamplifier **85** via terminal **86**. The core
power supply **87** is isolated and filtered by resistor **88** and capacitor **89**. Core power
supply **87** provides power to microprocessor **19**. The digital Input/Output power supply
90 is isolated and filtered by resistor **91** and capacitor **92**. The digital power supply **90**
25 provides power to memory chip **20**. The resistor **93** and capacitor **94** form an RC
network with a time constant of approximately 0.1 second, thereby permitting transients
to decay prior to the application of power to RESET terminal **95**. This ensures a clean
reset and start of microcontroller **19** into an electrically stable environment. Diode **96**
discharges capacitor **94** in the event of a major core power supply **87** transient, thereby
30 providing for a reset of microcontroller **19** if such a transient occurs.

The audio preamplifier **85** is a four stage amplifier with a bandpass filter **97** and
with a two bit automatic gain control circuit **98** as specified in the Sensory, Incorporated
manual for the RSC-164 Development Kit. When terminals **99** and **100** are set for a high

5 impedance input, the maximum gain is approximately 59 decibels at the center frequency of 1.49 KiloHertz. This is a gain for a typical application with the microphone about 1.0 to 1.5 feet from the user in a quiet environment. This may vary depending on the ambient environment. The 3 decibel cutoff frequencies are 580 KiloHertz and 4.2 KiloHertz. Resistor **101** supplies the power to a standard two wire electret microphone **10**. The
10 voltage divider resistors **102** and **103** are used to provide the DC bias for amplifier stages **104**, **97** and **105**, and it is set to approximately one third of the voltage appearing at terminal **86**. The first stage **104** has a gain of approximately 2.2. The bandpass filter **97** has a gain of approximately 7.8 at the center frequency of 1.49 KiloHertz. The two bit AGC circuit **98** is a programmable voltage divider consisting of Capacitor **106**, resistor
15 **107**, resistor **108**, resistor **109**, resistor **110**, and capacitor **111**. In order to prevent DC level shifts in response to AGC changes, the AGC circuit **98** is AC coupled by capacitor **106** and capacitor **111**. The AGC input control signals appearing at terminals **99** and **100** may independently be either at ground or at high impedance, giving four different levels of attenuation. The gain ratios for the AGC circuit **98** are 1.0, 0.36, 0.18 and 0.13. The
20 third stage amplifier **105** has a gain of 6.6, while the fourth stage amplifier **112** has a gain of 8. Resistors **113** and **114** provide adequate output bias current to prevent crossover distortion between third stage amplifier **105** and fourth stage amplifier **112**. Both of the output terminals **115** and **116** are AC coupled and then DC biased such that at full swing the negative peak voltage goes below zero volts DC (analog ground) at the the inputs of
25 speech recognition microcontroller **19**.

There are several pushbuttons attached to the microcontroller **19** digital Input/Output ports **156**, **157**, **158** and **159**. For example, a momentary microswitch **160** is activated by pushing a dollar bill into a slot **254** in the box **2**. The switch **160** detects the
30 action of a user paying for their cigarettes. A bellows switch **161** is an alternative method of detecting puffs or inhalations on a simulated cigarette. The bellows switch may also be replaced by a pressure sensor switch which can perform a similar purpose. Sound activated switch **162** , such as described in the Radio Shack catalog No. 276-5011A, is an alternative method of detecting either puffing on a simulated cigarette or coughing.

5 Similarly, the simulated cigarette can be designed to produce an audible or subaudible
whistle tone during puffing. The whistle tone can be sensed by the sound activated
switch **162** tuned with a bandpass filter encompassing the whistle tone frequency
spectrum. The puff switch sensor can be eliminated by using a sound integrator or sound
recognition software. In addition, the pushbutton **163** may be used to activate or wake up
10 the microcontroller **19** when it is in a power saving mode.

The following narrative referring to Figure 5 assumes that the smoking simulator
1 is used in a school environment. The “Teacher” is the person who sets up the device **1**
for use by the “Student”, and afterwards evaluates the student’s performance by
15 commanding the device **1** to produce a recorded report. The various software flowcharts
presented here are separated into modules which are functionally distinct from each other.
The overview flowchart **169** shows the general relationship between modules, and the
logical sequence of the flow of instructions from module to module. Subsequent
flowcharts illustrate the inner workings within each module.

20 In many of the flowcharts there are references to Sensory, Inc’s proprietary
software subroutines for various speech functions. Rather than explain them each time
they are used, they are summarized here. Speaker Verification (SV) subroutines are used
for storing and verifying passwords. SV subroutines can distinguish between individual
25 speakers. Speaker Independent (SI) Recognition subroutines are used for recognizing
specific commands or responses, no matter who says them. Speech Synthesis (SS)
subroutines simply playback a prerecorded word, phrase, or lengthy message. Continuous
Listening (CL) Recognition subroutines are used for recognizing specific commands or
sounds that may occur at unpredictable times, and must be listened to for an extended
30 period.

The software modules for the smoking simulation **1** are divided into two broad
groups. The modules focusing on the teacher’s activities start with POWERUP step **170**.
The student’s activities begin with the RUN module **171**. The teacher’s activities

5 configure the device **1** to recognize his or her passwords, provide the level of challenge they feel is appropriate and, after the simulation is completed, report the results of the student's use of the device **1**. The student's activities include recording their passwords, responding to demands from the device **1** to cough or perform simulated smoking, and listening to extensive educational material. The student also has the option of bumming
10 cigarettes from other students with similar devices **1**. The active operating time of the device **1** is brief compared to the total time it is used, so it spends a large portion of time in SLEEP mode **174** to conserve battery power.

Referring also to Figure 6, when the battery **79** is connected, the microprocessor
15 **19** must perform a "bootup" procedure **172** to properly configure timers, input/output ports, and interrupts. Otherwise they might initialize in a random configuration. Once these basic housekeeping activities are done, the microprocessor runs the applications program for smoking deterrence. There is no on/off or "reboot" switch. Those functions are accomplished by connecting and disconnecting the battery **79**. So each time the
20 battery **79** is reconnected, the software must request and store in step **173** the passwords from the teacher. In the preferred embodiment password security is twofold: (a) the teacher can keep their passwords secret, and (b) the software recognizes in verification step **175** the voice patterns of the individual teacher, so it is difficult for a student to cheat even if they discover the teacher's passwords. The passwords are used to limit access to
25 the subsequent simulation setup steps to the teacher alone. This precaution prevents the student from changing the conditions of the simulation.

A realtime clock, albeit not very accurate (say, plus or minus one hour), is needed to time some events for a specific part of the day. For example, as the exercise progresses
30 to simulate more frequent smoking, the student may be awakened in the middle of the night to have a desperate smoke or have an extended coughing fit. Therefore the software asks for and stores the day and time of the start of the simulation in instruction set **176**. The day is preferred because the software must report the total elapsed time of the simulation, and reporting the starting day and time is easier to understand than reporting

5 simply the number of hours elapsed. With the realtime clock initialized and running at clock startup step **177**, the device **1** can go to sleep and wait for the teacher to wake it up for further instructions to proceed with the student's portion of the software. Prior to entering sleep mode **174**, device **1** tells the teacher that it is awaiting their signal at prompt step **178**. This notification to the teacher is an attempt to make the device **1** user
10 friendly and self-documenting.

Referring also to Figure 7, the teacher wakes up the device **1** by pushing at interrupt step **180** a wakeup button **179** which can be labelled "Teacher". Upon
15 completing wakeup step **181**, the device **1** will verify that it is indeed the authorized teacher who is responsible for the activation by asking for and verifying the teacher's password at step **173**. If password verification fails, the software returns to the step **178** in the POWERUP module to notify the teacher that it is going to sleep to await a valid wakeup call. If the teacher's passwords are correctly verified, the software asks the
20 teacher via request **182** to state one of several commands, such as Report **183**, Run **184**, Buy Cigarettes **185**, Packs Per Day **186**, Escalation Rate **187**, Metabolic Rate **188**, Susceptibility **189**, or Information Frequency **190**. If command recognition fails, the software returns to the step **178** in the POWERUP module to notify the teacher that it is going to sleep to await a valid wakeup call, just as it would if password verification
25 failed. If the teacher commands Report **183**, the device **1** will recite the appropriate measurements of the student's activity with the device **1**. A few examples of data included in the report recitation are elapsed time, number of cigarettes demanded, number of cigarettes consumed, number of delays in responding to demands to smoke, and number of cigarettes borrowed. If the teacher commands Run **184**, the software will
30 jump to the RUN module **171** where the student-related software begins.

The day-to-day monetary cost of smoking is one of its aspects simulated by the device **1**. The device **1** keeps track of an imaginary inventory of cigarettes, decrementing the inventory whenever the student smokes, and incrementing the inventory whenever the

5 student “purchases” more from the teacher. Therefore, when the teacher commands Buy Cigarettes **185**, the software will ask at step **191** for the teacher to set the number of packs of cigarettes available to the student before more must be purchased. The upper limit is high enough that it is effectively unlimited, in case the teacher does not want a limit. The software has several other variables which can be set by the teacher to tailor the

10 simulation to their needs. The initial level of addiction can be set by commanding an initial smoking rate **192** in packs per day. The teacher also sets the escalation rate **193**, that is, how many days it takes to escalate from one pack per day to two or three or four packs per day. This will often depend on how long the student can keep the simulator before it must be used by someone else, and how rigorous a lesson the teacher wants the

15 student to endure. For example, the medium settings simulates a one pack a day habit on the first day, two packs a day on the second day, and three packs a day on the third day. The student’s physiological response to nicotine is simulated by setting two other variables, metabolic rate **194** and susceptibility **195**. These variables are described in the curriculum literature that accompanies the device **1**. In general, these variables are

20 dependent on the student’s level of physical activity (active or inactive) and body weight. The rate of educational information **196** recited to the student can also be set by the teacher. If the teacher sets the simulation to last only one day, the goal will typically be to inundate the student with a rapid rate of information **196**. If the simulation is intended to last a week, the information rate **196** may be reduced to a relatively meager rate.

25 After each variable has been set by the teacher, the program returns via path **197** to ask the teacher to give another command. When the teacher finishes setting as many variables as they wish, the teacher will respond to the request for command with silence or a noncommand word. The software will then return to idling step **178** in the POWERUP module and notify the teacher that the device **1** is going to sleep.

30

Referring also to Figure 8, the RUN module **171** is an “Executive” routine because it performs calculations, checks lookup tables, and otherwise makes decisions that affect the course of events throughout the student’s use of the device **1**. Most of the other modules in device **1** merely respond to calls from interrupts or from the RUN

5 module **171**. The RUN module **171** is the only module that makes activity scheduling decisions. Throughout the simulation, the device **1** will make demands of the student, await the student's response, and measure and record that response for eventual reporting to the teacher. Each time the student responds to a demand, the device **1** will verify that the response is coming from the correct student (the student to which device **1** was
10 assigned). This keeps the students honest and prevents them from giving the device to, for example, a little brother, to play with. An added benefit is that when the student knows they cannot cheat, they pay closer attention.

To enable verification of the student's identity, the device **1** as a first step **198**
15 records a student's password. The verification step **198** of the software can only be accessed immediately after the teacher executes Run command **184**, so the teacher will be present to ensure that the designated student records their voice-dependent password. Once this is done, the student cannot access verification step **198**. The passwords can only be changed by the teacher, using their own passwords, or by removing the battery
20 **79**, which is detectable by the teacher since it will affect the realtime clock **177** as well as the teacher's passwords.

The student is given some choices to tailor the simulation to their personal preferences, which will hopefully give the student a greater interest in the results. First the
25 student selects at step **199** a brand of cigarettes. Each brand will have its own market appeal, cost, nicotine content, and carcinogenic effect, which will be recorded in the device's memory **20**, and will be used in calculations that follow. The student next chooses a personality **200** for their device. The personality **200** traits apply to only a few of the messages from the device **1**, but are hopefully frequent enough to keep the student
30 interested and paying attention. Personality **200** traits include Humorous, Sarcastic, Motherly, Scientific, Suggestive, Teenage or Random.

The core of the simulation scheduling software resides in the next two steps **201** and **202** which calculate the realistic physiologic effects on the student of the simulated

5 nicotine addiction defined by the values the teacher has previously set for the simulation variables. This includes calculation **201**, using equations from actual pharmacokinetic studies, of the student's simulated blood nicotine content using variables such as: (a) how long ago did they last smoke a cigarette, what brand of cigarette was it (nicotine contents vary), how fast did they smoke it, and how completely did they smoke it, (b) how fast do
10 they metabolize nicotine, (c) what is their physiologic susceptibility to blood nicotine level, and (d) what time of day is it (metabolic rates vary).

From these physiological calculations **201**, the software will assign a simulated nicotine craving level **202** to the student. This craving level **202** ranges from mild
15 agitation through many levels of anxiety and irritability all the way up to immobilizing nausea. This craving level **202** will be communicated to the student in several ways: (a) Demands for a smoke, (b) Nicotine level warnings, (c) General information and factoids, (d) Detailed descriptions of how they would feel and demands for how they should act, (e) Random and escalating nagging, and (f) General advice and guidance. Based on the
20 student's simulated craving level **202**, the software will decide by using a series of lookup tables the appropriate level of intensity of educational messages at any given time during the simulation, and select the addresses within electronic memory **20** of the messages to playback to the student. In the extreme case where a student excessively delays smoking to the point of withdrawal, and the long delayed cigarette is finally smoked, the software
25 could demand a vomiting episode in which the student must make a retching noise that the software can recognize. That particular activity is scheduled in the nicotine craving level step **202**, although it is actually performed in the SMOKING ACTION module **203**.

As the simulation progresses to higher levels of addiction and more frequent
30 smoking, the calculated physiologic effects **201** will escalate, and the simulated damage to the student's lungs will accumulate. Part of this calculation is based on the carcinogenic effect of the cigarette brand chosen by the student. As a result, the device **1** will demand more frequent and more severe coughing fits from the student, eventually to

5 the point of waking the student up in the middle of the night to cough, smoke, and cough some more.

Other information that may be calculated and communicated to the student includes pulse rate variations, lung capacity reduction, blood pressure increase, stress on
10 the heart, and other diseases or conditions to which smokers may be susceptible because of their smoking. The software will update the value of a “Deathclock” that measures the expected minutes/days/years of lifespan lost assuming that the current trend of simulated smoking proceeds unchecked. The deathclock is calculated by nicotine craving level block **202** but reported in the SMOKING ACTION module **203**, immediately after the
15 student smokes, to give the student immediate feedback on the long term consequences of their smoking.

Once the nicotine craving block **202** has calculated what messages regarding smoking, coughing, and educational information should be communicated to the student,
20 and when they should be communicated, the software will setup internal timers **204** to wake itself up at the appropriate times. The device **1** will go to sleep and wait for those interrupts. Once asleep device **1** will also respond to pushbutton interrupts from either the student or the teacher.

25 Referring also to Figure 9, the smoking notification module **205**, which is called by the RUN module **171**, simply notifies the student that it is time to smoke. The student must respond via the Student Pushbutton **163** before simulating smoking. Simulated smoking is processed by the SMOKING ACTION module **203**. The device **1** has three notification methods **206** of notifying the student that it is time to smoke. There is a
30 pager-type vibrator that the student can feel if the device is in their pocket. There is a beeper-type beep that the student can hear if the device is in their purse or if they are asleep. Finally, after a short pause, there is a spoken demand for smoking. After notifying the student, the device scheduler **207** sets the next notification for five minutes in the future. This ensures an irritating nagging process for as long as the student puts off

5 smoking. Then the software returns to calculator **201** and nicotine craving block **202** in the RUN module **171** to recalculate the student's simulated nicotine level and craving level based on the extra time elapsed, and then returns to sleep mode **174**.

As seen in Figure 11, the Information Notification module **208**, which is called by
10 the RUN module **171**, simply notifies the student that it is time to listen to educational information. The student must respond via the Student Pushbutton **163** before listening to the information. The device **1** has three methods **209** of notifying the student that it is time to listen to information. There is a pager-type vibrator that the student can feel if the device is in their pocket. There is a beeper-type beep that the student can hear if the
15 device is in their purse. And finally, after a short pause, there is a spoken demand for the student to listen to information. After notifying the student, the device **1** sets the notification timer **210** for five minutes in the future. This ensures an irritating nagging process for as long as the student puts off listening to the information. Then the software returns to the calculator **201** in the RUN module **171** to recalculate the student's
20 simulated nicotine level, craving level and message intensity level based on the extra time elapsed. The device **1** then enters sleep mode **174**.

As seen in Figure 14, the COUGHING INTERRUPT module **211**, called by the RUN
module **171**, both notifies the student that it is time to cough, and monitors whether they
25 do or do not cough. This action cannot be delayed, only passed or failed. The Student Pushbutton **163** is neither required nor active when module **211** is active.

The device **1** has three methods **212** of notifying the student that it is time to cough. There is a pager-type vibrator that the student can feel if the device is in their pocket. There is a beeper-type beep that the student can hear if the device is in their purse. And
30 finally, after a short pause, there is either a spoken demand for coughing or loud playback of a recorded cough. In order to wake up students in the middle of the night, the device **1** may playback a coughing fit rather than a spoken demand. After notifying the student, the device **1** initiates verification step **198** by asking for the student's passwords, thereby making sure that the right student will be coughing.

The RUN Executive routine **171** will pass a parameter to coughing module **211** specifying the demanded intensity of the coughing episode. The parameter may specify anything from a single hack to an extended coughing fit. The coughing module **211** will at cough prompt **213** ask for, listen for, and recognize the student coughing some specified number of times. If the student fails to cough appropriately, the device will give them the option **214** to try again. Their success **215** or failure **216** will be noted before returning to the RUN module **171** for recalculations **201** and the return to sleep mode **174**.

After the student has been notified that the device demands either smoking or information playback, the student can press the Student pushbutton **163** to indicate that they are ready to perform the demanded action. This wakes the device **1** up from the sleep mode **174**. After awakening, the device **1** asks for and verifies at step **198** the student's passwords to make sure that the correct student has awakened the device **1**. Next, the device **1** asks for the student's command **217** to either smoke, bum cigarettes, or playback educational information. At this point, depending on student delays, random chance generator **218**, and recognition by the software of extraneous epithets, the software may select belligerence path **219**. For example, the software may randomly tell the student that they are out of matches. If the software follows belligerence path **219**, repetition step **220** will tell the student to try again later, or issue a similarly appropriate message. If the software cooperates with the student via cooperation path **221**, as it most likely will, then the program returns to either the smoking action module **203**, bumming module **222**, or information playback module **223**.

Referring also to Figure 16, the smoking procedure **203** begins with an internal check **224** to see if there are any simulated cigarettes remaining in inventory. If not, the device **1** will so inform the student via announcement **225** and then return to the RUN module **171** for recalculations **201** and sleep **174**. From the RUN module **171** the student

5 can either wake the device and bum a cigarette from another student via module **222**, or “buy” cigarettes from the teacher. If there are cigarettes remaining, the device will execute announcement **226** and tell the student to “Puff away”, then enter a Continuous Listening subroutine **227** to listen for puffs at variable intervals.

10 When each puff is recognized, the consumption rate step **228** will calculate how much of the cigarette has been smoked. This calculation **228** will include the intensity and duration of the puff as well as the interval since the last puff. If the cigarette is not done, the program will follow return path **229** to subroutine **227** and listen for another puff. If this was the first puff occurring after nicotine withdrawal as calculated by counter
15 **230**, the program will execute demand **231** for a retching sound from the student. After the retch is recognized the device **1** will tell the student, via message bank **232** a message chosen by random message generator **233** such as “You just barfed on your lit cigarette. You must smoke another, after washing your hands.” or “Barf into a toilet, then flush the toilet”. The device **1** will listen for and recognize via sound monitor **234** the sound of the
20 toilet flushing. If no puff is heard at step **227**, the software will continue to ask the student if they wish to try again **235**. If not, the software will record a failure **236** and return to the RUN module parameter calculator **201**.

When the cigarette is done there may be another randomly generated smoking
25 event **233** such as the device **1** saying, for example, “You burned your fingers! Scream out loud!” or “You burned a nearby piece of furniture. Put a stickon burn decal on a nearby piece of furniture”. After a pause, the device **1** enables deathclock monitor **237** and says “Done” and reads out the value of the Deathclock. The software records the accumulated duration and intensity of puffs from this cigarette at recorder **238** for use by
30 the RUN module in recalculating blood nicotine level at calculator **201**. Then the cigarette inventory **239** is decremented, and the software returns to the RUN module for recalculation **201** and sleep **174**.

5 Students must perceive this overall simulation device **1** as realistic in order to embrace and make the most of the educational experience. Borrowing or “bumming” cigarettes is a realistic feature of the device **1** intended to encourage active communication among students. As best understood by reference to Figure 17, if two students with similar devices **1** agree that one will allow the other to bum a cigarette from him, then the two of them will simultaneously wakeup their devices **1** and command them to enable the bum cigarettes module **222**.

Each device **1** will ask its student whether they choose to give or receive a cigarette at question **240**. The donating device **1** will check its inventory to ensure that it has cigarettes to give. If there are none, device **1** will inform the student along failure path **241** and return to RUN module step **201** and sleep mode **174**. If the device **1** does have cigarettes to give, device **1** will listen **242** for a unique “Receiving” tone from the other device **1** asking for a cigarette. When the software recognizes **243** the “Receiving” tone device **1** will immediately playback **244** a unique “Given” tone (actually a secret composite tone so it is difficult to counterfeit) for a few seconds. Then the software will decrement **245** its inventory of cigarettes and return to the RUN module **201** and sleep mode **174**.

The “Receiving” device **1** will begin a loop **246**, lasting a maximum of ten seconds, during which loop **246** will alternately playback the “Receiving” tone for half a second, then listen for half a second for the “Given” tone of acknowledgement from the other device **1**. Once device **1** recognizes **247** the “Given” tone, the software increments **248** its inventory and returns to the RUN module **201** and sleep **174**.

30 The total number of cigarettes given and received is recorded and reported to the teacher so that cheating (e.g. bumming one cigarette to multiple receivers simultaneously, or tape recording the “Given” tone) can be easily detected. One can eliminate cheating by embedding a unique two-way code in the transmitted tones, or by requiring one-to-one physical connection between devices for communications. Typically, the device’s added

5 complexity and cost are not warranted since occasional counting by the teacher will suffice to deter cheating.

There are many methods of communicating between devices for bumming cigarettes. As a passive example, one might install contacts on each box connected to a
10 100K ohm resistor. When the devices are touched together in parallel, the resistance drops to 50K ohm. The microcontroller **19** can measure this resistance reduction. As an active example, the students might touch together contacts on the devices while pushing appropriate buttons. The preferred approach adds no hardware or software beyond that which already exists for tone playback and recognition.

15

As best seen in Figure 18, every piece of educational information that is recited by the device **1** ends with a true/false or yes/no question **249**. Listening interval **250** begins thereafter to determine if the student has answered the question **249**. The student must give the correct answer **251** to the question **249** in order to prevent the information from
20 being repeated at some later time. The software records whether the question was answered correctly at register **252** or incorrectly at register **253** before returning to the RUN module for recalculation **201** and sleep mode **174**.

As those skilled in the art will appreciate, the simulator **1** can be equipped with a
25 variety of different programs with different timings, information, and curriculum depending on whether the device **1** is simulating, for example, smoking tobacco, marijuana, ingesting cocaine, or injecting other drugs.

30

ABSTRACT

A simulator (1) which may be programmed to interactively mimic the effects of an addictive habit as well as the characteristics of a particular personality or trait. A case (2) houses a speaker (9), microphone (10), visual display (15) and associated electronic components, including a microprocessor (19). Numerous messages as stored in a nonvolatile random access memory (20) which are issued to a user of the device (1) to prompt the user to engage in activities that would simulate participation in the addictive behavior being simulated. In one version, the simulator is used in a teaching environment and includes controls (180) that permit a teacher to select certain simulation parameters. In the case of a simulation of the habit of smoking, such parameters would include, for example, the number of packages of cigarettes available for consumption (191), the number of packages to be consumed each day (192) and the rate at which the user's craving for nicotine will escalate (193). The device (1) will calculate various physiological parameters (201) and generate information (202) relevant to the elapsed time since the simulation began. The simulator (1) includes a signaling device (206) such as a beeper or vibrator to notify the user that a cigarette must be consumed. The microprocessor (19) is programmed to recognize sounds such as coughing and inhaling received through the microphone (10) to ensure that the user is performing these activities in response to prompts by the device (1). An orifice (8) is formed within the surface (5) of the case (2) into which a straw or tube (17) is inserted through which the user must occasionally exhale, inhale or puff. A slot (254) is formed within the case to receive currency in order to simulate the purchase of the addictive product.

Claims

I Claim:

1. An addiction simulator for education about and deterrence of drug use, comprising:
 - 10 a. an enclosure;
 - b. an electronic circuit, the electronic circuit being housed within the enclosure;
 - c. an actuator, the actuator switch being electrically interconnected to the electronic circuit; and
 - 15 d. a pushbutton switch, the pushbutton switch being responsive to an activity of a user of the addiction simulator which simulates participation in an addictive activity.
2. The addiction simulator of claim 1, further comprising an alphanumeric display, the alphanumeric display being mounted to the enclosure so as to be visible to a user of the simulator, the alphanumeric display being interconnected to the electronic circuit, the
20 alphanumeric display being responsive to actuations of the pushbutton switch.
3. The addiction simulator of claim 1, further comprising:
 - a. a slot, the slot being formed within a surface of the enclosure, the slot being dimensioned so as to permit the introduction of a thin material into the enclosure; and
 - 25 b. a momentary contact switch mounted adjacent to the slot and electrically interconnected to the electronic circuit, the momentary contact switch sensing the presence of money within the slot.
4. The addiction simulator of claim 1, further comprising:
 - 30 a. a bellows switch, the bellows switch being electronically interconnected to the electronic circuit; and
 - b. a breathing tube, the breathing tube passing from an interior region to an exterior region of the enclosure, the breathing tube being in fluid communication with the bellows switch such that inhaling through the breathing tube activates the bellows switch.

5 5. The addiction simulator of claim 1, further comprising a pressure sensor, the pressure sensor being electronically interconnected to the electronic circuit and fluidly interconnected to the breathing tube such that relative inhalation magnitudes can be sensed by the electronic circuit.

10 6. The addiction simulator of claim 1, further comprising a microphone, the microphone being electrically interconnected to the electronic circuit, the microphone detecting sounds made by a user of the simulator.

15 7. The addiction simulator of claim 1, further comprising a speaker, the speaker being interconnected to the electronic circuit, the speaker thereby issuing audible indications to a user of the simulator.

20 8. The addiction simulator of claim 1, wherein the electronic circuit further comprises a speech recognition circuit, the speech recognition circuit being programmed to recognize bodily sounds.

25 9. The addiction simulator of claim 1, wherein the electronic circuit further comprises a speech recognition circuit, the speech recognition circuit being programmed to recognize mechanical sounds.

10. The addiction simulator of claim 4, wherein the breathing tube further comprises a whistle, the whistle producing a tone when a user of the simulator inhales through the tube, the speech recognition circuit being programmed to recognize the tone.

30 11. The addiction simulator of claim 7, wherein the electronic circuit further comprises a speech synthesizer, the speech synthesizer being electrically interconnected to the speaker, the speech synthesizer generating verbal messages to a user of the simulator.

5 12. A portable personality simulator for achieving behavior modification and education
of a user of the simulator, comprising:
 (a) a case;
 (b) an electronic circuit housed within the case; and
 (c) a speaker, the speaker being housed within the case and being electrically
10 interconnected to the electronic circuit, the speaker emitted sounds prompting the user to
behave in a desired manner.

13. The portable simulator of claim 12, further comprising at least one sensor, the sensor
being electrically interconnected to the electronic circuit, the sensor detecting and
15 verifying at least one behavioral act of the user in response to sounds emitted from the
speaker.

14. The portable simulator of claim 13, wherein the sensor further comprises a
microphone, the microphone detecting sounds made by the user.

20 15. The portable simulator of claim 12, further comprising a recess, the recess being
formed within the case, the recess being adapted to secure an accessory used in
association with the simulator.

25 16. The portable simulator of claim 12, further comprising a hypodermic simulation
device, the hypodermic simulation device producing a signal when activated, the signal
being sensed by a sensor and being subsequently processed by the electronic circuit.

17. The portable simulator of claim 12, further comprising an orifice formed within the
30 case, the orifice being adapted to receive a substance simulating money, the substance
being required in response to prompting of the user by sounds emitted by the speaker.

18. The portable simulator of claim 14, further comprising a speech synthesizer, the
speech synthesizer being electrically interconnected to the electronic circuit, the speech

5 synthesizer generating spoken questions which are emitted by the speaker, the
microphone detecting user responses, the electronic circuit verifying the user response.

19. The portable simulator of claim 12, further comprising a visual display, the visual
display being mounted to the case, the visual display being electrically interconnected to
10 the electronic circuit, the visual display issuing messages to the user.

20. The portable simulator of claim 12, further comprising an orifice formed within the
case, the orifice permitting introduction of air outside of the case into an interior region of
the case.

15 21. The portable simulator of claim 20, further comprising a breathing apparatus, the
breathing apparatus being affixed to the orifice, the breathing apparatus permitting the
user to exhale into the interior region of the case.

20 22. An entertainment device, comprising:
a. a case;
b. a power source;
c. a programmable electronic circuit, the programmable electronic circuit being
powered by the power source;
25 d. a voice synthesizer, the voice synthesizer being electrically interconnected to
the programmable electronic circuit, the voice synthesizer issuing spoken prompts and
taunts to a user of the entertainment device. and
e. a communications port, the communications port permitting interconnection of
the entertainment device to another entertainment device, thereby permitting exchange of
30 programmed information between devices.

23. The entertainment device of claim 22, further comprising a visual display, the visual
display being electrically interconnected to the electronic circuit, the visual display
issuing visual prompts and taunts to a user of the device.

5

24. The entertainment device of claim 23, further comprising a microphone, the microphone being electrically interconnected to an electronic circuit, the microphone receiving sounds produced by a user of the device, the electronic circuit generating prompts and taunts in response to sounds received by the microphone.

10

25. The entertainment device of claim 22, wherein the case further comprises:

a. a bore passing through a surface of the case;

b. a tube interconnected to the bore and extending outwardly from the case, the tube being adapted to permit a user of the device to exhale into and exhale from the case;

15

c. at least one vent perforation formed within the case, the vent perforation permitting exhaled air passing through the tube into the case to exit from the case and to permit inhaled air to enter the case; and

d. a flow restrictor, the flow restrictor affecting the effort which a user must exert to inhale through the tube.

20

26. The entertainment device of claim 22, further comprising a memory, the memory being electrically interconnected to the electronic circuit, the memory containing a plurality of messages which are used as prompts and taunts delivered to a user of the device.

25

27. The entertainment device of claim 26, wherein at least some of the plurality of messages contained in the memory are related to cigarette consumption by a user of the device.

30

28. The entertainment device of claim 26, wherein at least some of the plurality of messages contained in the memory are related to life expectancy of a user of the device.

5 29. The entertainment device of claim 27, further comprising a plurality of user
selectable software choices, each user selectable software choice pertaining to a particular
type of addictive behavior practiced by human beings.

30. The entertainment device of claim 28, wherein the case further comprises a slot, the
10 slot being adapted to receive currency, the currency being required by the device to
simulate purchase of a product being consumed by a user of the device.

31. The entertainment device of claim 29, wherein the case is formed to mimic a
container normally used in commerce as a container of a product consumed by a user of
15 the device.

32. The entertainment device of claim 31, wherein the memory simulates borrowing a
quantity of the product from another entertainment device via the communications port.

20 33. A portable personality simulator, comprising:
a. a case;
b. a programmable electronic circuit housed within the case; and
c. a speech synthesizer, the speech synthesizer being interconnected to the
electronic circuit, the electronic circuit being programmed to issue commands simulating
25 a particular type of personality.

34. The portable personality simulator of claim 33, further comprising:
a. a microphone, the microphone being interconnected to the electronic circuit;
and
30 b. a voice recognition device, the voice recognition device being interconnected
to the electronic circuit and the microphone, the voice recognition circuit verifying that a
user of the simulator has complied with the commands issued by the simulator.

5 35. The portable personality simulator of claim 34, further comprising at least one personality trait including:

- a. paternalism;
- b. superiority;
- c. humor; and
- 10 d. demanding.

36. The portable personality simulator of claim 32, wherein the simulator is programmed to emulate the personality of a celebrity.

15 37. The portable personality simulator of claim 32, wherein the voice recognition device is programmed to identify a sound associated with at least one bodily function including:

- a. exhaling;
- b. coughing;
- c. snoring;
- 20 d. vomiting;
- e. inhaling; and
- f. puffing

38. The portable personality simulator of claim 35, wherein the electronic circuit is
25 programmed to analyze an intensity parameter related to the sound of a bodily function.

39. The portable personality simulator of claim 36, wherein the electronic circuit is programmed to identify a plurality of sounds occurring in an environment responsive to commands issued by the simulator.

30 40. The portable personality simulator of claim 39, wherein at least one of the sounds identified by the electronic circuit includes:

- a. running water;
- b. flushing toilet;

- 5 c. vacuum cleaner;
 d. dishwasher;
 e. motor running;
 f. striking a match;
 g. opening an aluminum can; and
10 h. opening a refrigerator.

41. The portable personality simulator of claim 38, further comprising a recording function, the recording function producing a record of a user's compliance with sommands issued by the simulator, the record being reportable to a person.other than the
15 user.

42. The portable personality simulator of claim 39, wherein the case further comprises a money receptacle, the money receptacle permitting a user of the simulator to deposit money in response to commands issued by the simulator.
20

25

Electronics Box (E-box)

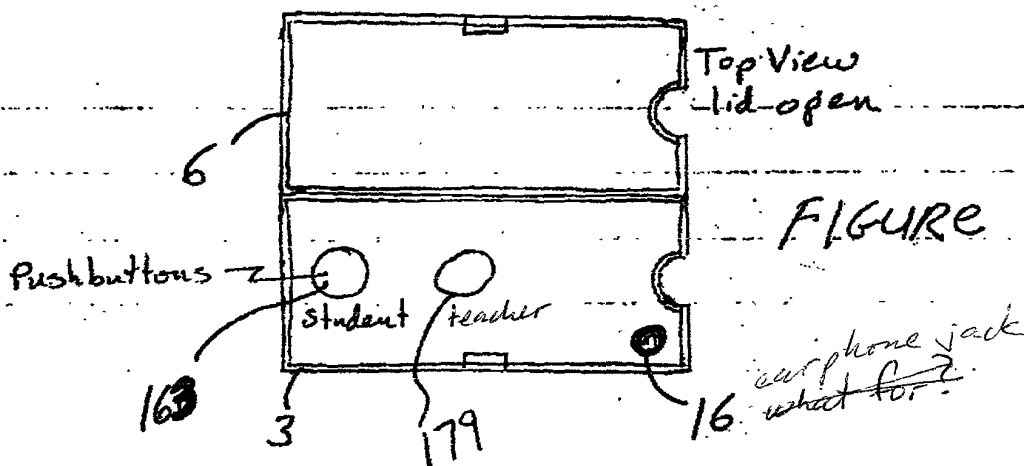
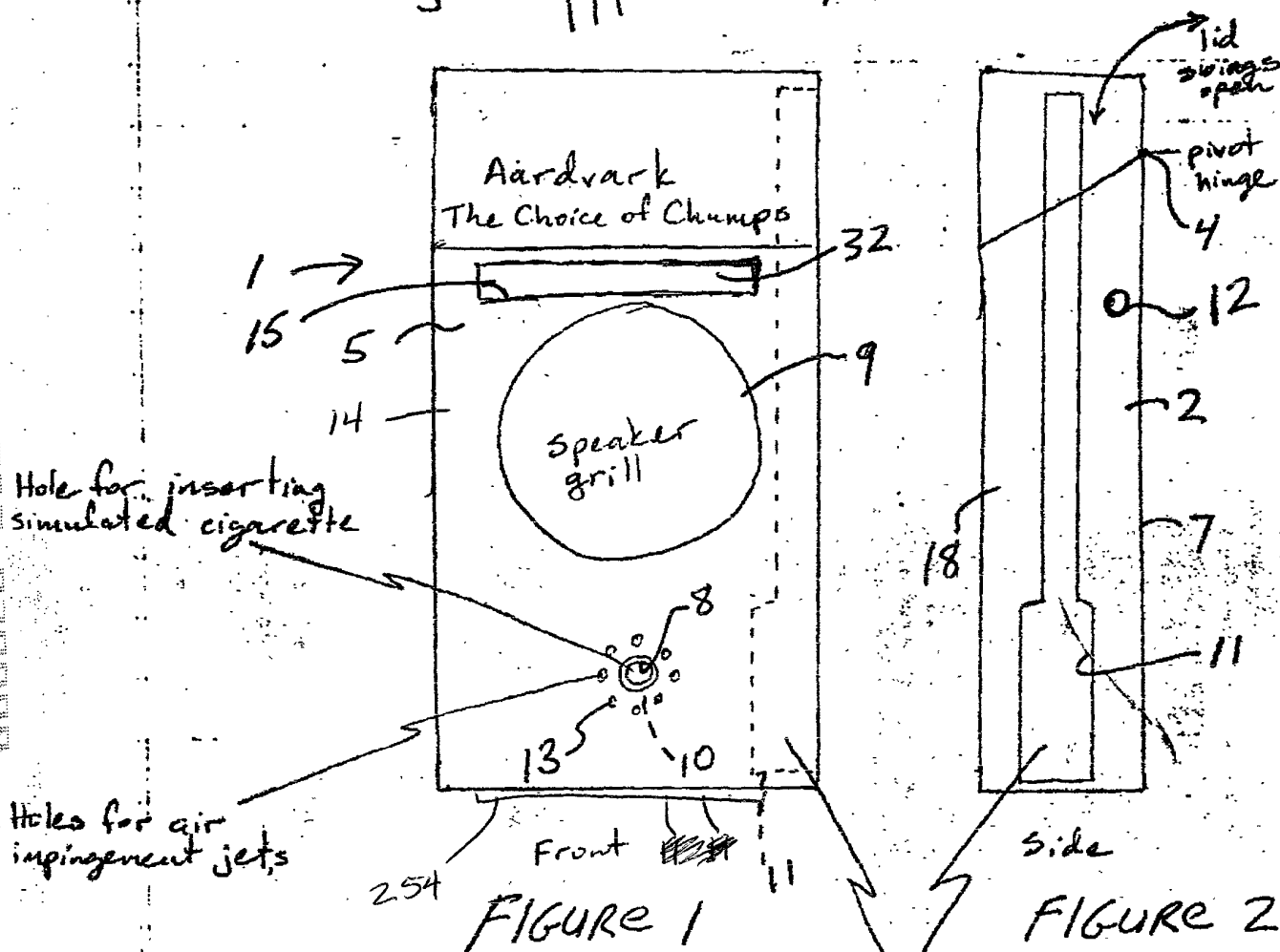
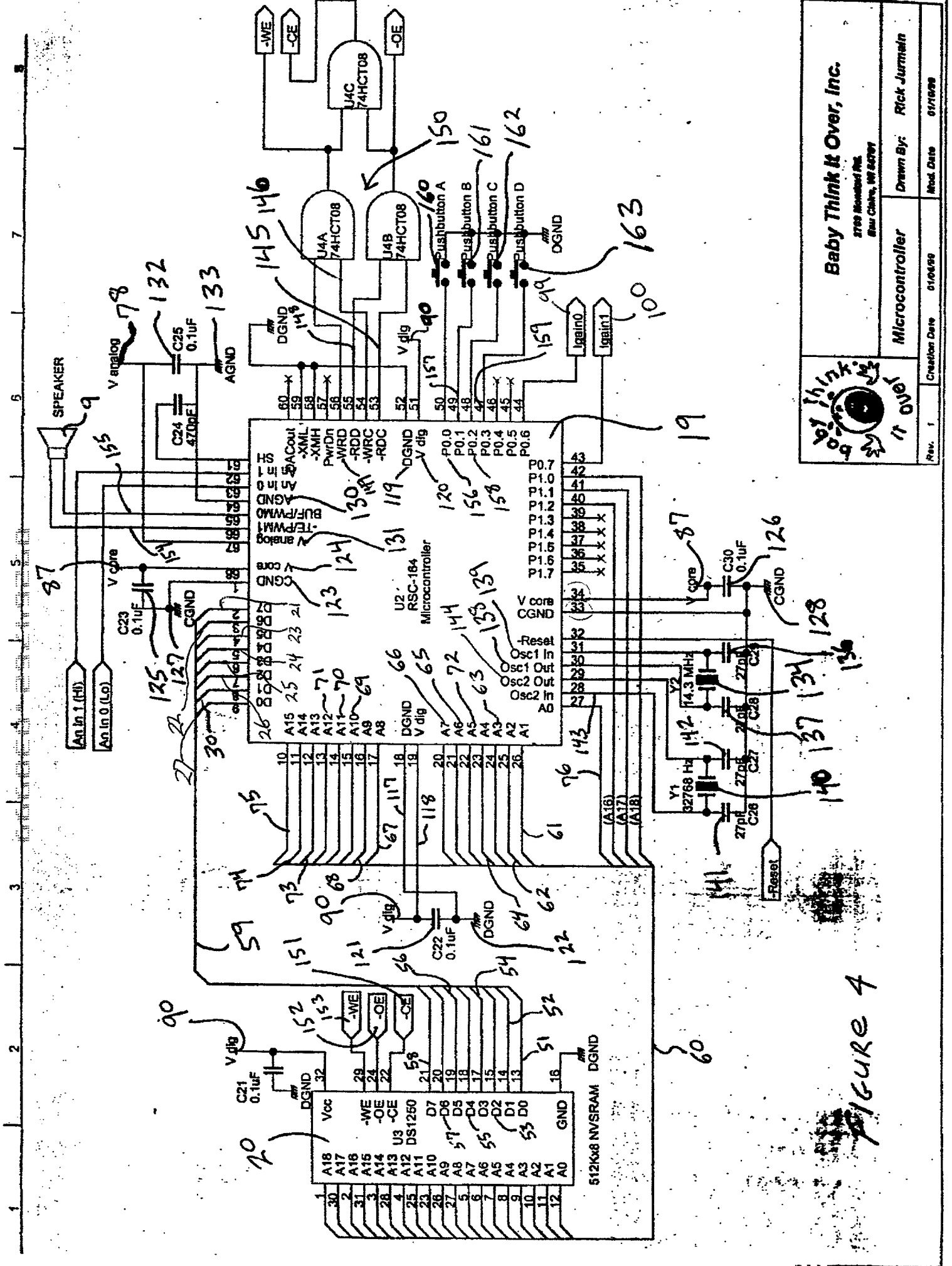


FIGURE 3



Recess for holding simulated cigarette (puff device) externally so it can be cleaned for sanitary reasons.

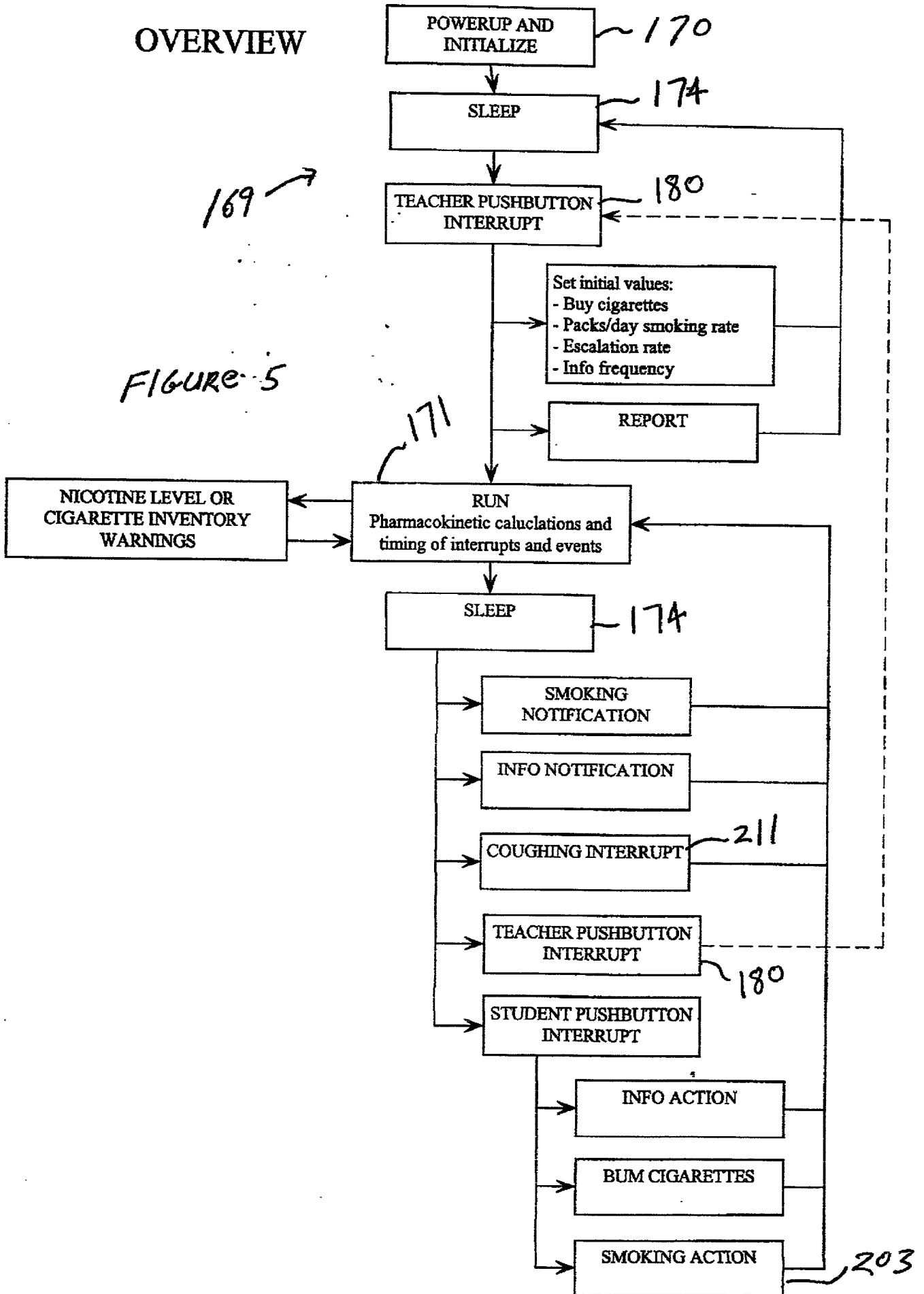


Baby Think It Over, Inc.
 3700 Monmouth Ave.
 Freehold, NJ 07728

Microcontroller
 Drawn By: Rick Jurnalein

Rev. 1
 Creation Date: 01/04/99
 Mod. Date: 01/10/99

OVERVIEW



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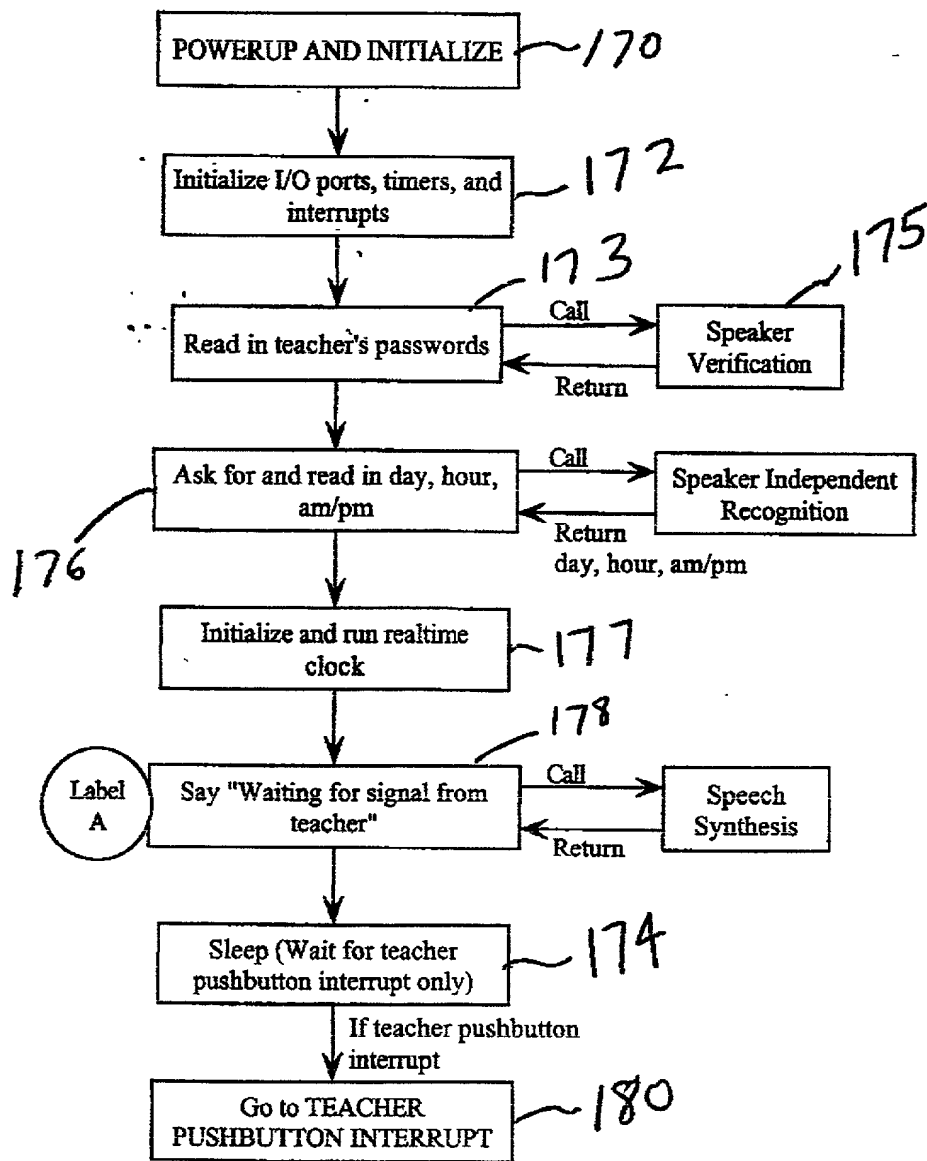
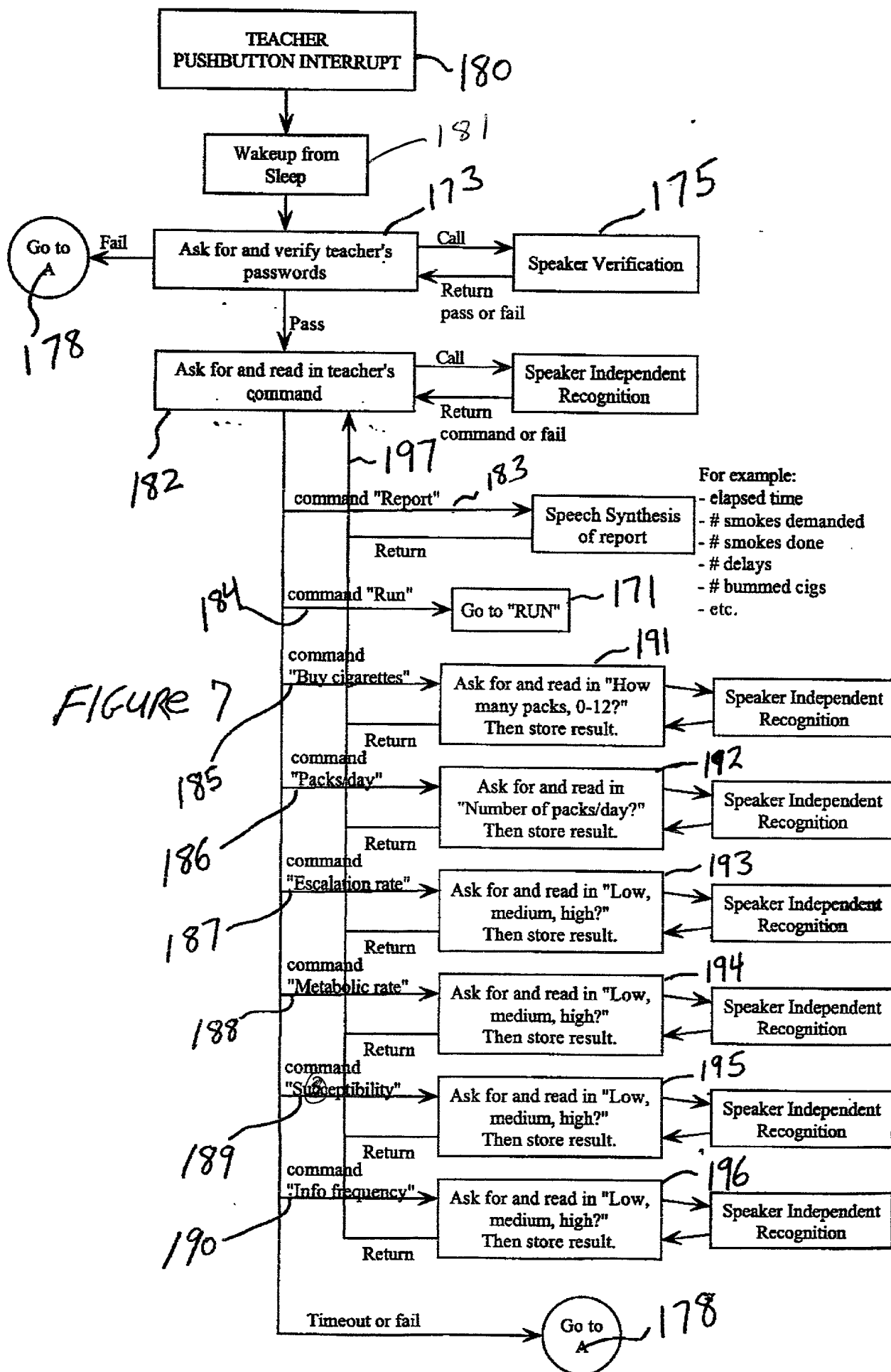


FIGURE 6



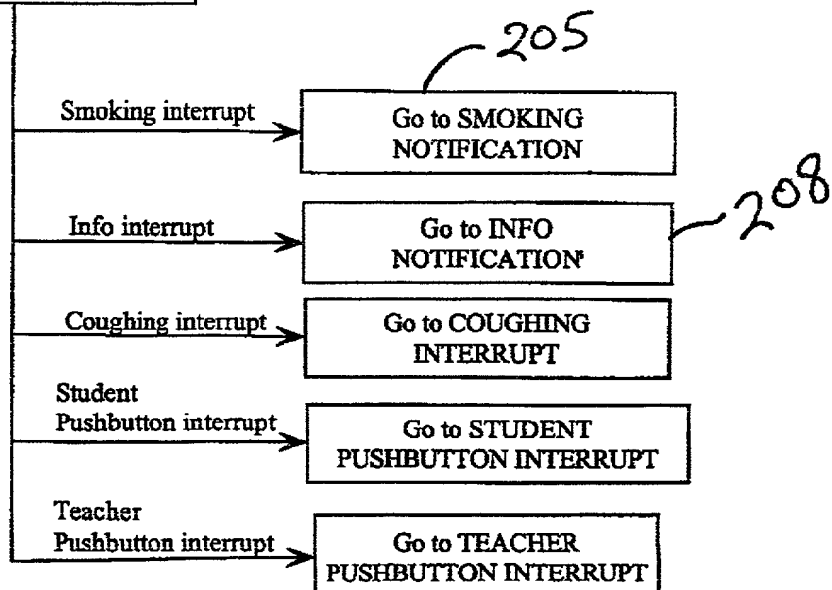
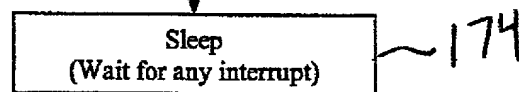
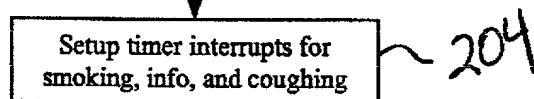
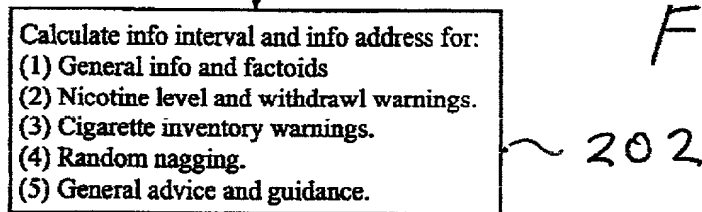
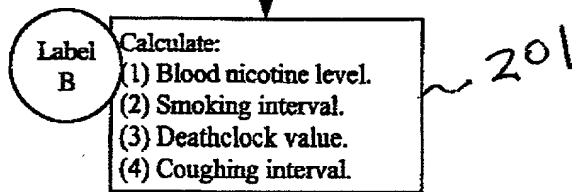
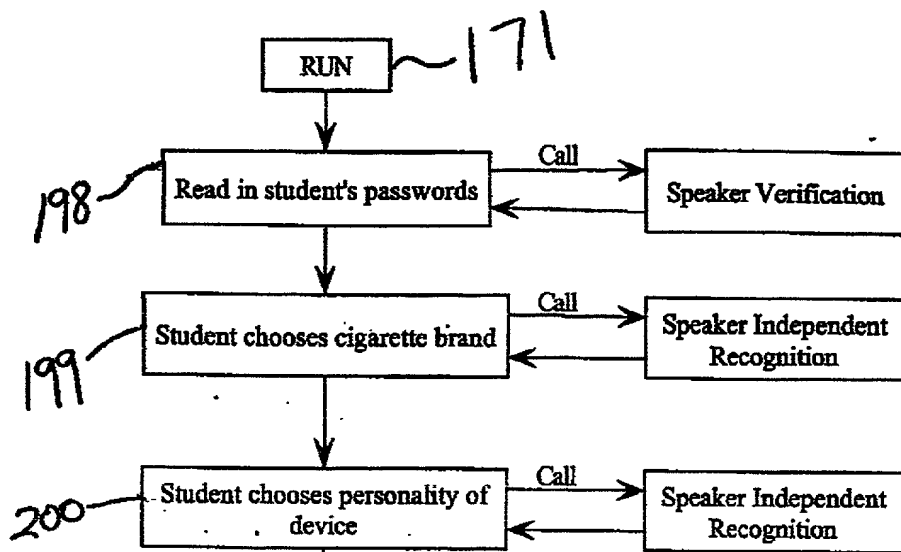


FIGURE 8

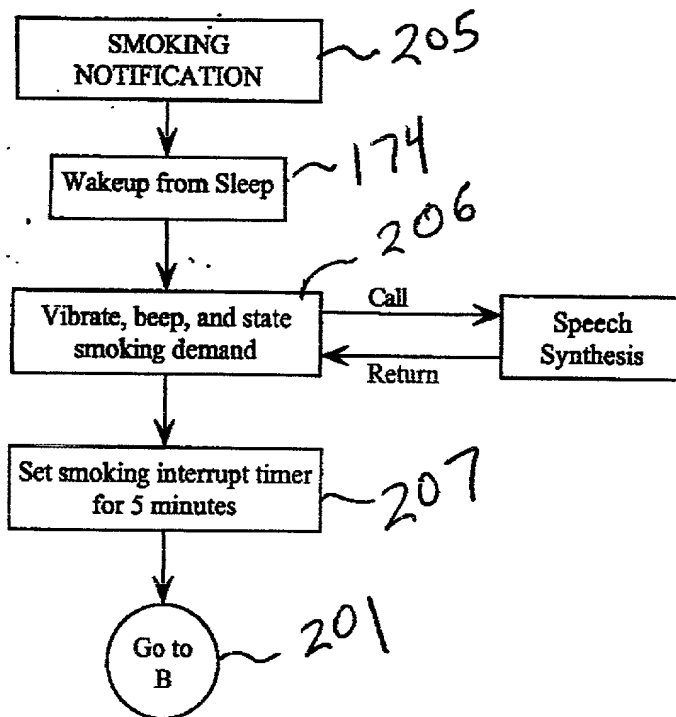



FIGURE 9



Baby Think It Over, Inc.
2708 Mendon Rd.
Burlington, WI 53191

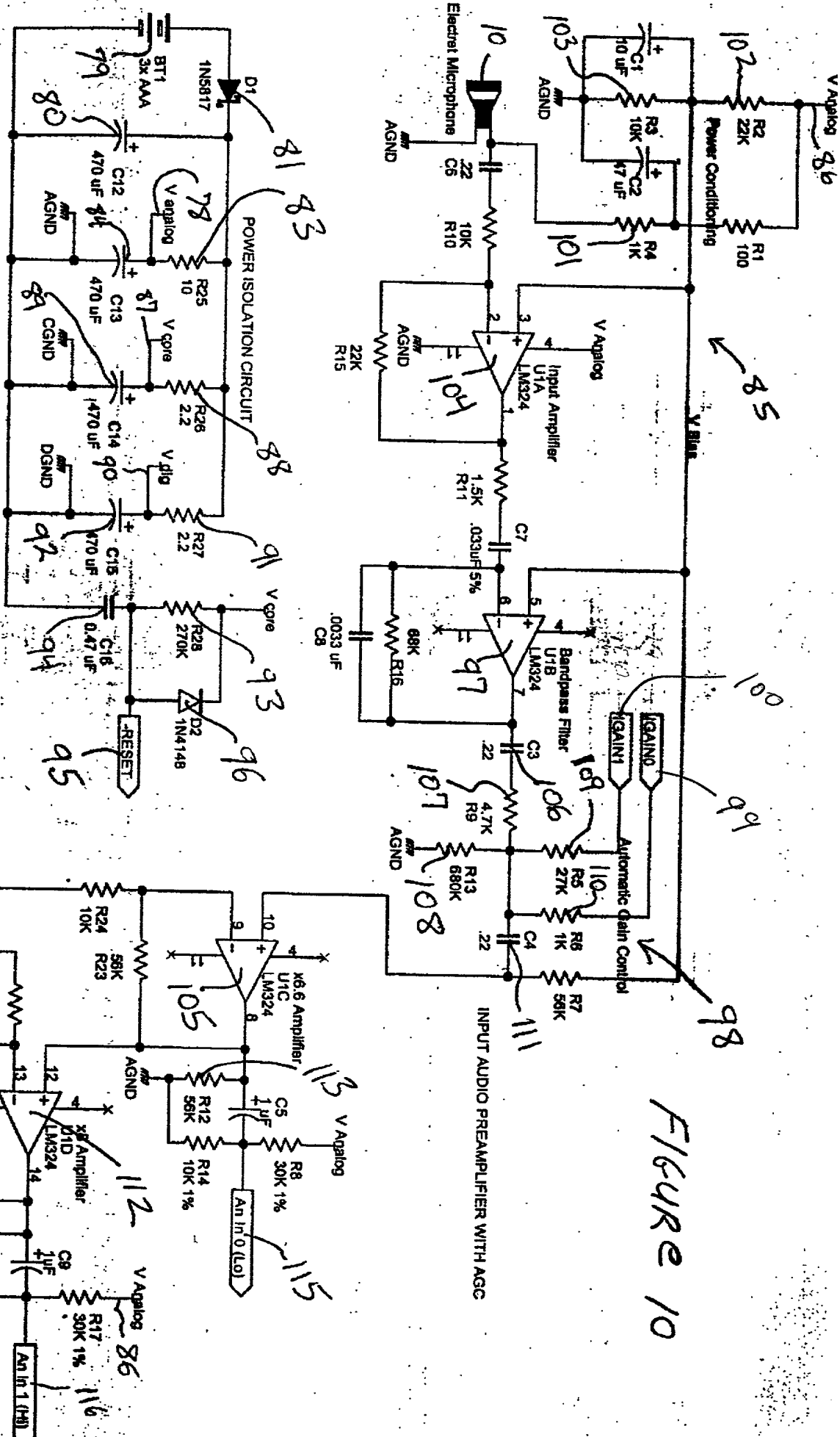
Rev. 1

Creation Date 01/01/00

Mod. Date 01/01/00

Pramp and Power

Drawn By: Rick Jurnain



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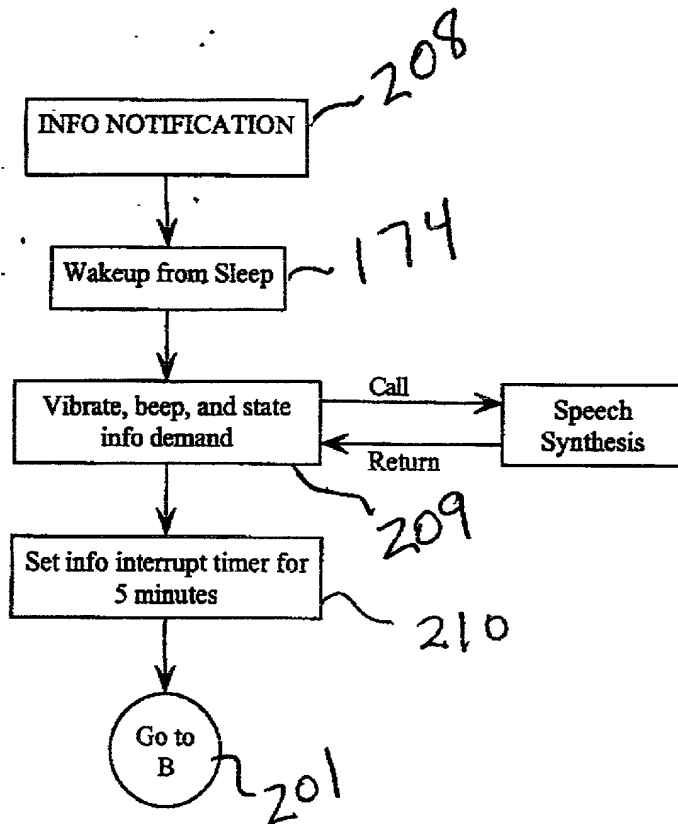


FIGURE 11

Microphone cavity in E-box for puff sensing
(with straw inserted) and other sound sensing
(without straw).

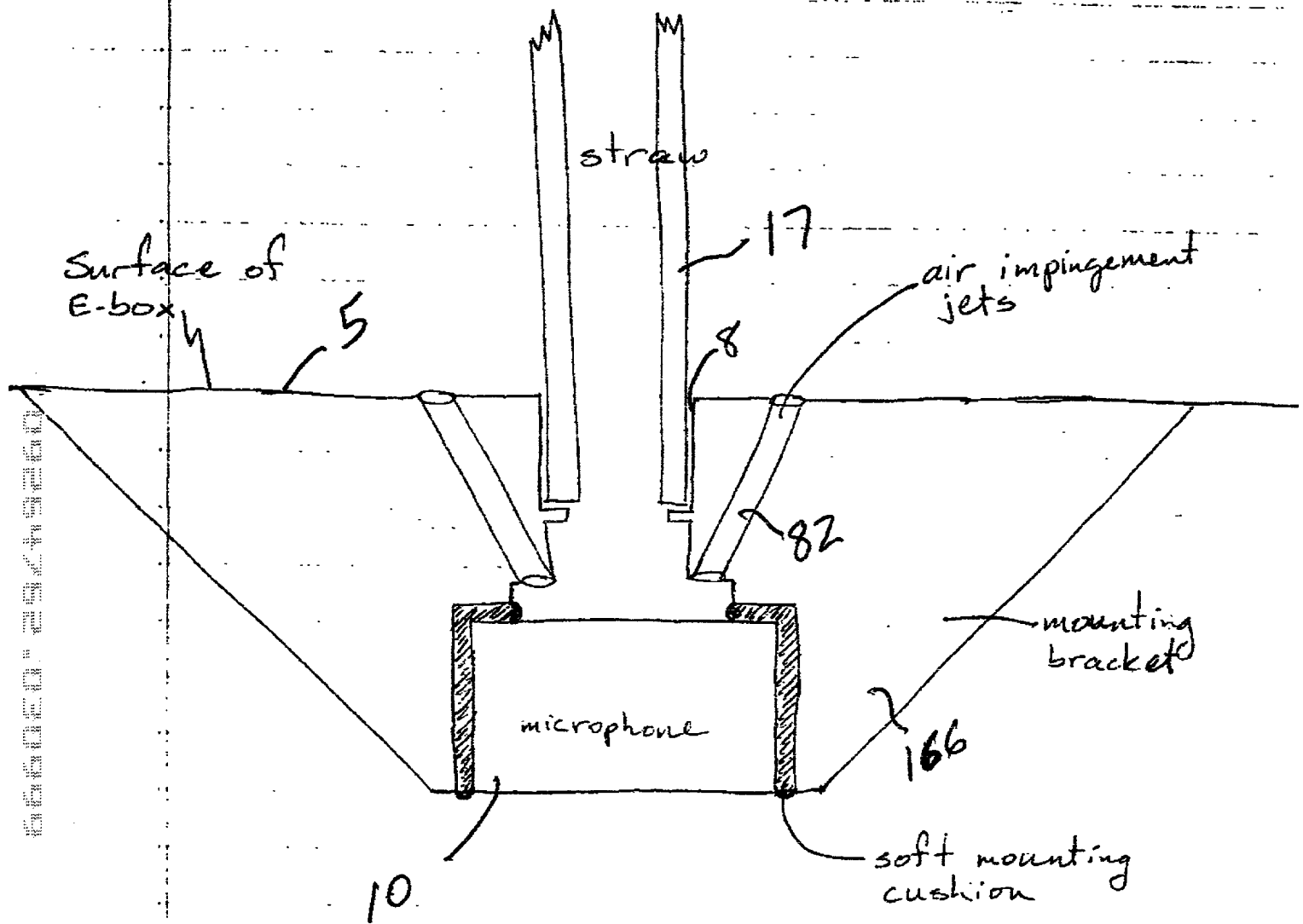
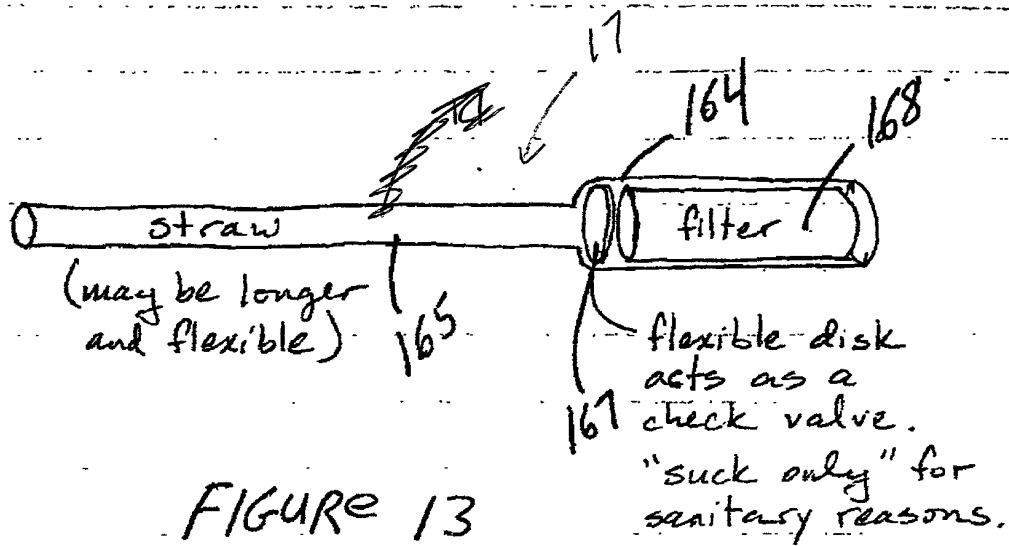


FIGURE 12

Puff device with flow restriction.



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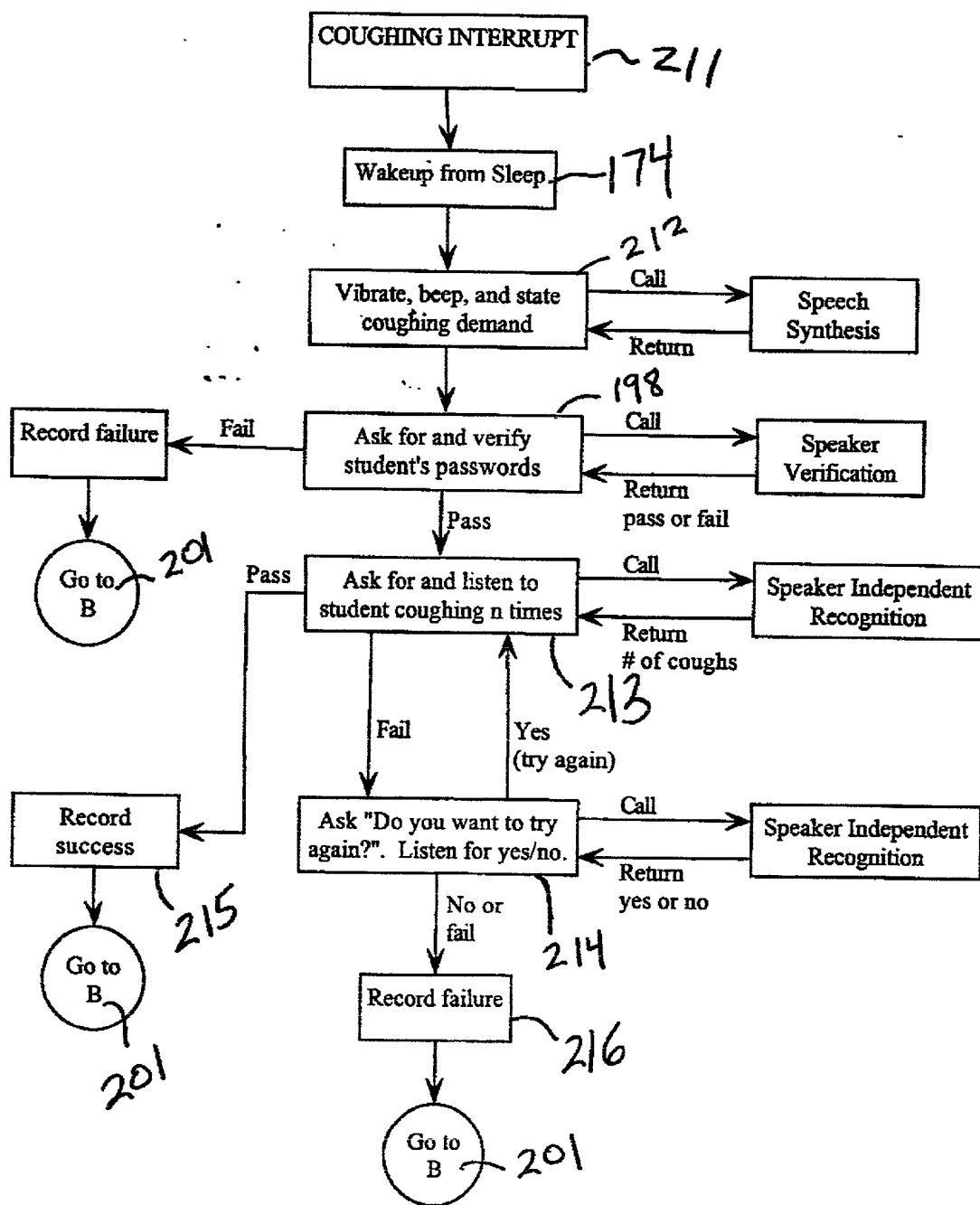
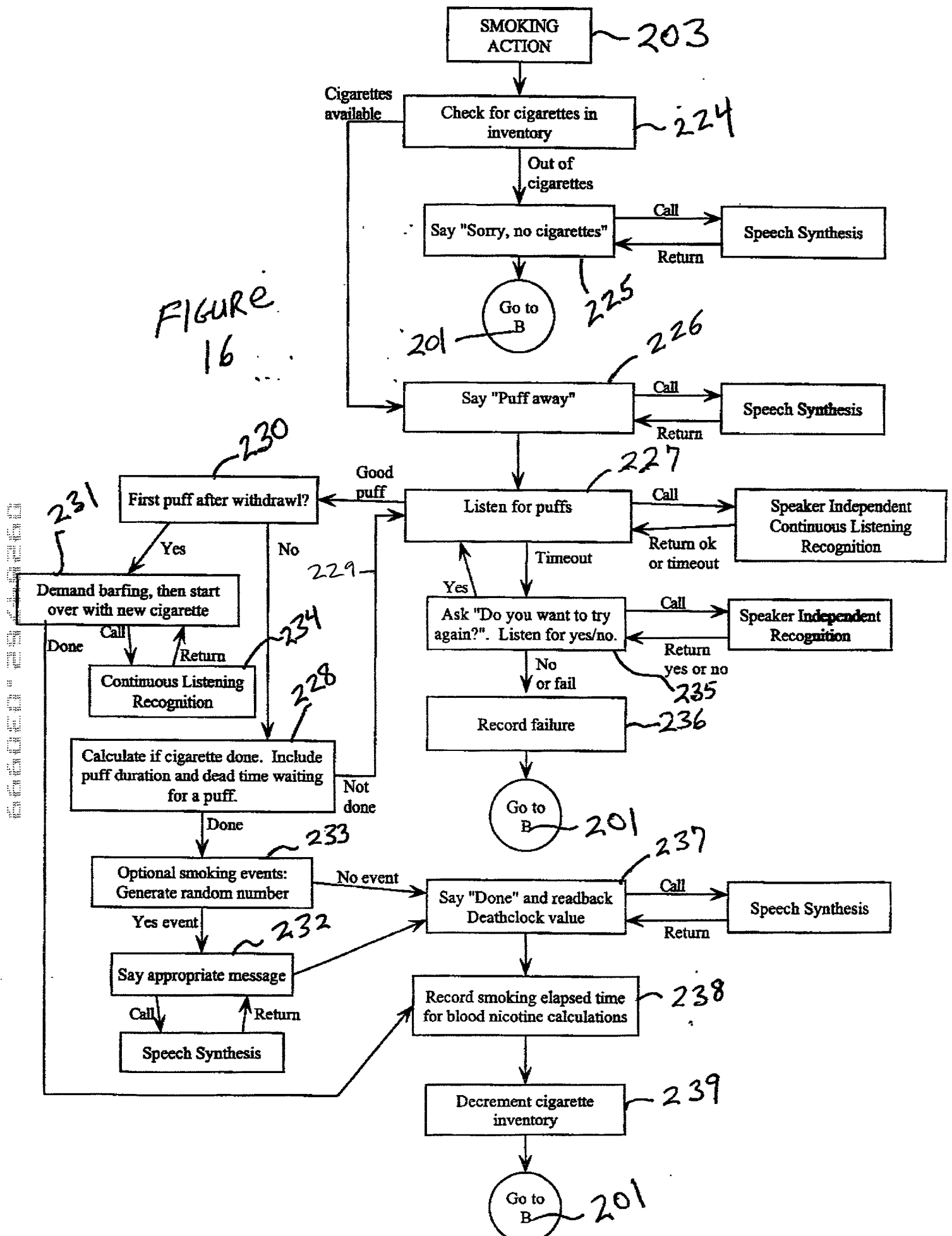


FIGURE 1A

FIGURE 16



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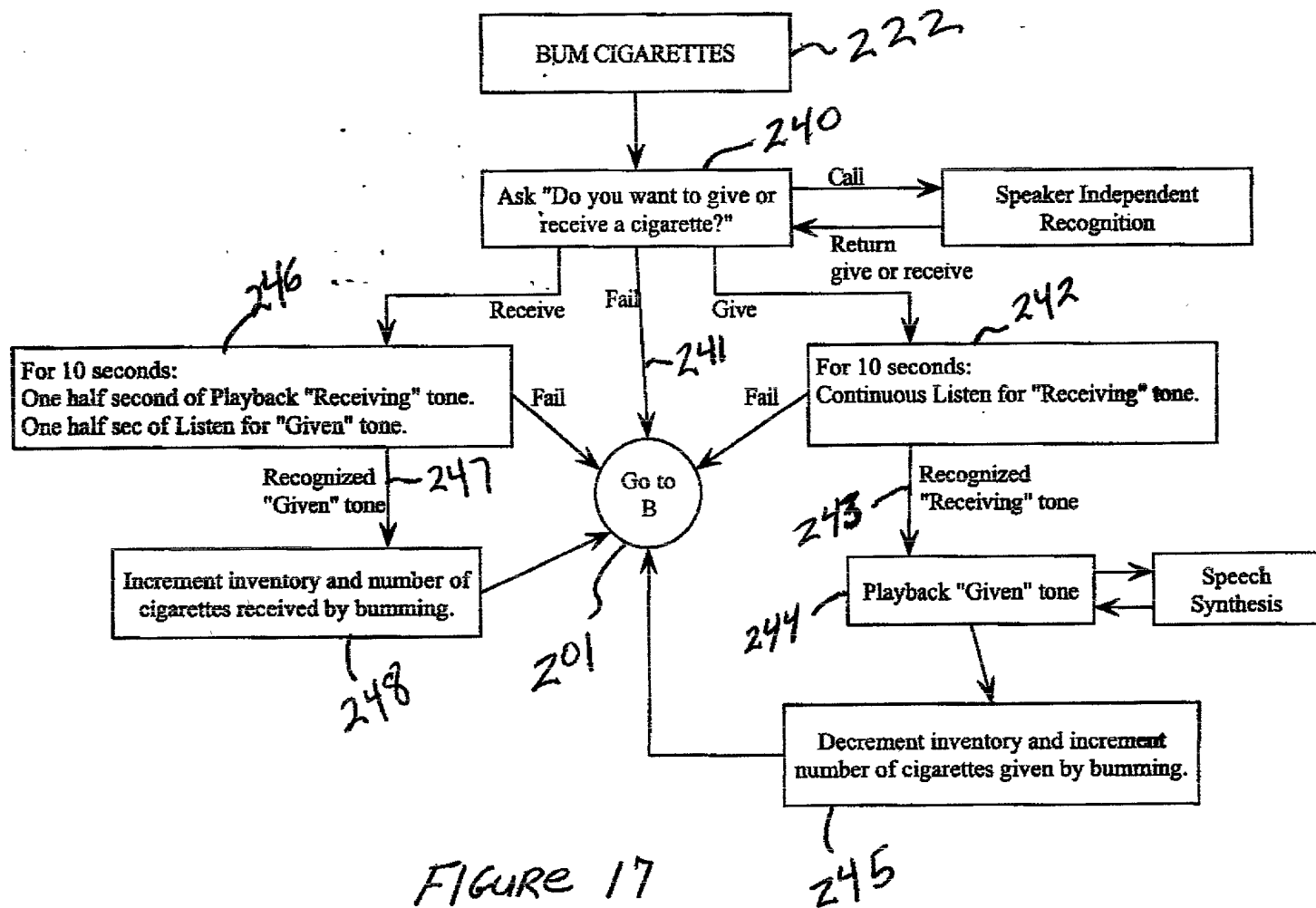


FIGURE 17

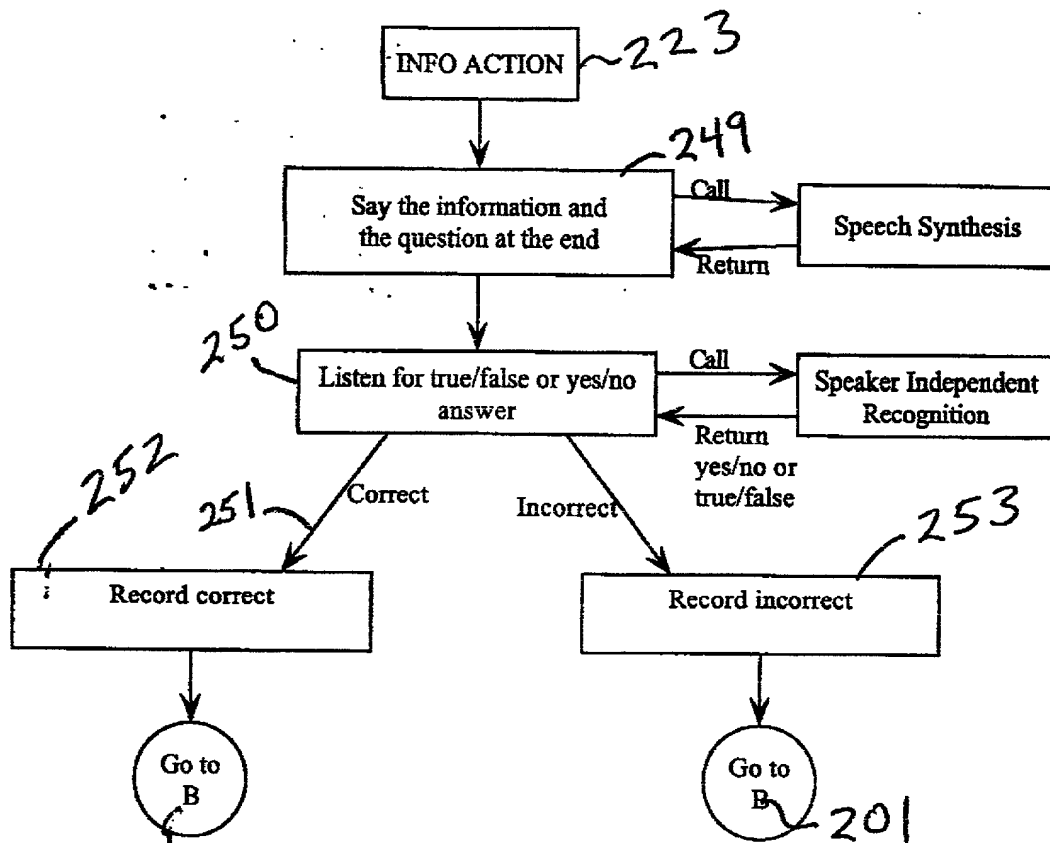


FIGURE 18

Docket No.
BTO019USPT01

Declaration and Power of Attorney For Patent Application

English Language Declaration

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name,

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled

DEVICE FOR SIMULATING SOME ASPECTS OF CIGARETTE USE

the specification of which

(check one)

☒ is attached hereto.

☐ was filed on _____ as United States Application No. or PCT International Application Number _____ and was amended on _____ (if applicable)

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose to the United States Patent and Trademark Office all information known to me to be material to patentability as defined in Title 37, Code of Federal Regulations, Section 1.56.

I hereby claim foreign priority benefits under Title 35, United States Code, Section 119(a)-(d) or Section 365(b) of any foreign application(s) for patent or inventor's certificate, or Section 365(a) of any PCT International application which designated at least one country other than the United States, listed below and have also identified below, by checking the box, any foreign application for patent or inventor's certificate or PCT International application having a filing date before that of the application on which priority is claimed.

Prior Foreign Application(s)

Priority Not Claimed

(Number)

(Country)

(Day/Month/Year Filed)

☐

(Number)

(Country)

(Day/Month/Year Filed)

☐

(Number)

(Country)

(Day/Month/Year Filed)

☐

I hereby claim the benefit under 35 U.S.C. Section 119(e) of any United States provisional application(s) listed below:

_____ (Application Serial No.)	_____ (Filing Date)
_____ (Application Serial No.)	_____ (Filing Date)
_____ (Application Serial No.)	_____ (Filing Date)

I hereby claim the benefit under 35 U. S. C. Section 120 of any United States application(s), or Section 365(c) of any PCT International application designating the United States, listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States or PCT International application in the manner provided by the first paragraph of 35 U.S.C. Section 112, I acknowledge the duty to disclose to the United States Patent and Trademark Office all information known to me to be material to patentability as defined in Title 37, C. F. R., Section 1.56 which became available between the filing date of the prior application and the national or PCT International filing date of this application:

_____ (Application Serial No.)	_____ (Filing Date)	_____ (Status) (patented, pending, abandoned)
_____ (Application Serial No.)	_____ (Filing Date)	_____ (Status) (patented, pending, abandoned)
_____ (Application Serial No.)	_____ (Filing Date)	_____ (Status) (patented, pending, abandoned)

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

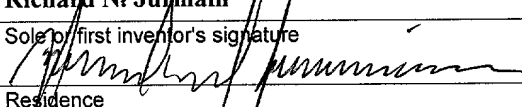
POWER OF ATTORNEY: As a named inventor, I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith. *(list name and registration number)*

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